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- **Hisense** Mini LED
- **Roksan** BluOS amplifier
- **Yamaha** $649 bar+sub
- **'Something About Mary'** So after 25 years, does the hair-gel gag still stand up?

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JBL's first-ever turntables inside!

VINYL BARGAINS!

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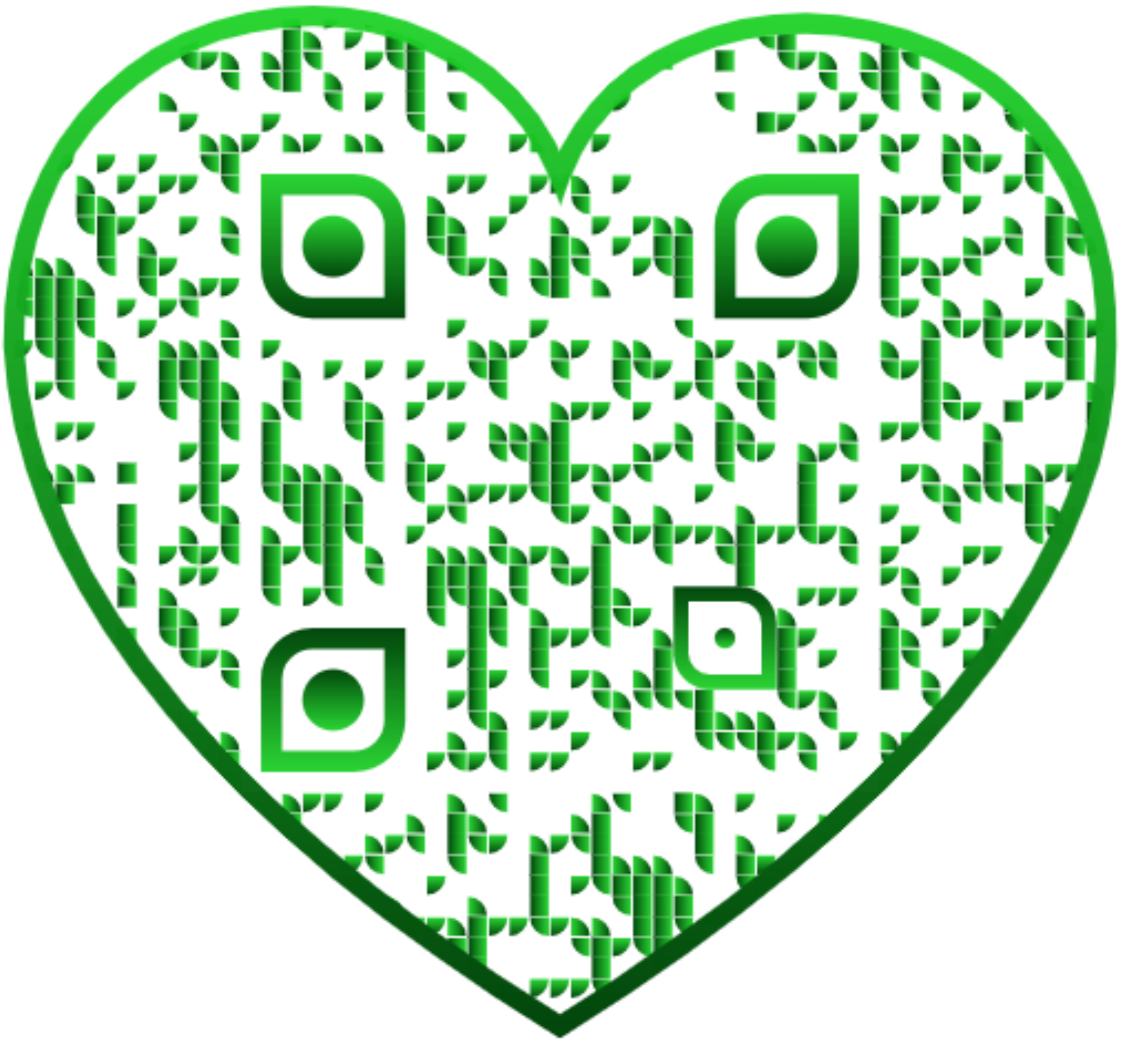

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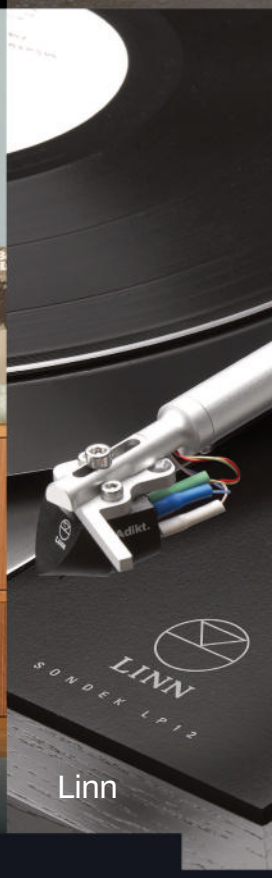

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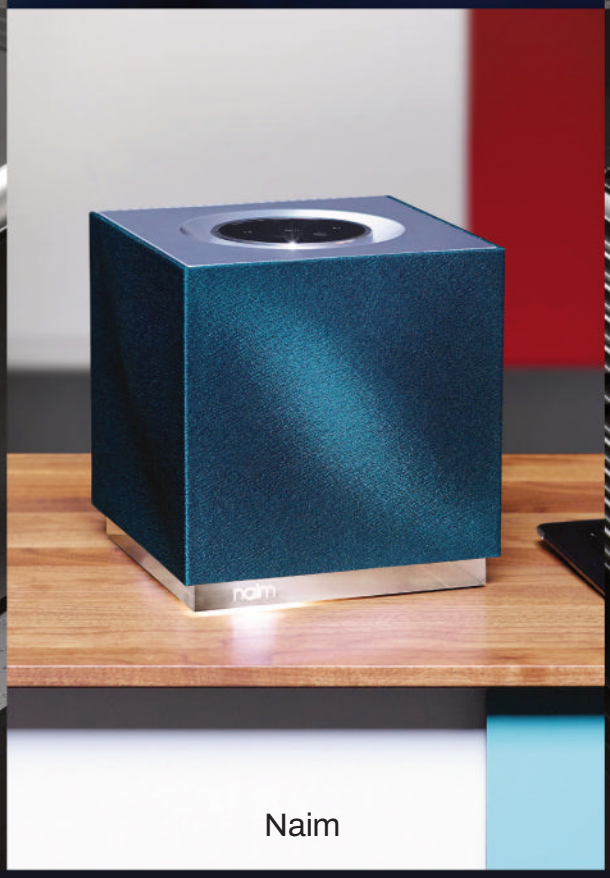

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We'll throw away 86% of your music, OK?

The Editor wishes the world could be more lossless. But it can't.

Every time we put together an issue of *Sound+Image* focused on vinyl, I plan to open it up with a comment piece extolling the joys of LP records and how much pleasure this surviving music format brings to my life. But it seems that every time, something happens in the world of Bluetooth that interrupts my thoughts. It's happened again.

Bluetooth, Bluetooth, Bluetooth. We love it, but we hate it. It serves us so well so much of the day when we're out and about, anywhere the music itself is perhaps more important than the ultimate quality at which it reaches us. We can accept that and keep our efforts at purity for the home.

So it's important that we do know the quality available from the various ways to send audio wirelessly, so that when we are home on that search for quality, we can achieve the best possible results.

Bluetooth has an organisation, the SIG, the Special Interest Group, which has a membership including thousands of companies and which oversees Bluetooth advances and applications and codecs and such. There's some useful insight into the SIG's processes in our monumental interview this issue with two engineers from Fraunhofer, the German research giant which has two new codecs, LC3 and LC3plus, one bring made for Bluetooth and 'given away' at the request of the SIG, but LC3plus rather better and still applicable to Bluetooth, so that it will hopefully be a good licence moneyspinner for Fraunhofer.

One of the reasons I was speaking to the engineers was to untangle how they think the reduced bit rates of the new Bluetooth LE could improve sound quality rather than, as I think inevitable, make it worse. Their new codecs will help, they say, though of course those new codecs would sound even better if they were allowed a higher bit rate! LC3plus might operate as a third-party codec within Bluetooth Classic, where it would deliver significantly improved results over LDAC or aptX, according to Fraunhofer's figures, especially at the lower bit rates to which these codecs switch when there is a busy wireless environment.

This is a key issue. The Fraunhofer guys identify 256kbps as the maximum bit rate which can be relied upon in a real-world Bluetooth scenario. Hence Sony's LDAC connection often won't play at the 990kbps which might produce Sony's "near high-res" quality; LDAC may drop its transmission on the fly to 660kbps or 330kbps, at which you'll get 'nowhere near high-res'. And there's no warning when this happens, other than it might not sound so good.

But LDAC is not lossless anyway. There is an 'aptX Lossless' codec which might just hit CD quality losslessly if supported at both ends of the chain while getting perfect Bluetooth reception up at around 1.5Mbps, which engineers consider almost a theoretical best-use scenario. It seems likely that Qualcomm may still call this codec 'aptX Lossless' even if it appears in LE systems which can't possibly hit lossless transmission. So it would be called Lossless, even though it couldn't possible be so.

At least we have those pretty golden Japan Audio Society logos for Hi-Res Audio and Hi-Res Audio Wireless. Those surely indicate lossless high-res, no?

Not according to Fraunhofer, which pointed out to us that there is no mention of 'lossless' anywhere around those logos. They tell me the Japan Audio Society has some way of deciding for themselves whether enough information is getting through, and they will certify if enough passes, but it doesn't have to be lossless, nor can I find anyone who knows or will say what the criteria are. Without that information, the badge becomes meaningless.

Besides, I simply don't understand what is meant by high-res audio which is not lossless. As the name suggests, any method which isn't lossless involves throwing information away — huge amounts of information in most cases. Sending the lowest of high resolutions, a 24-bit/48kHz file, say, requires a bit rate of 2304kbps. You can achieve lossless data compression (meaning you can reconstruct the original exactly, bit-for-bit) of around 50%, so you might just pass that 24/48 losslessly through a perfect Bluetooth Classic connection if you're getting that hopeful 1500kbps.

But nobody can rely on a connection that fast, so most codecs are designed to work at far lower rates. For aptX HD the *maximum* is 576kbps, so when it plays 24-bit/48kHz it's throwing away a full half of the data, even allowing for initial lossless compression. What is thrown away exactly? The codec decides what information your ears won't miss. Is it right? Who knows.

When preparing our *News* this issue, we read the literature for a new pair of Triangle speakers with aptX HD, where it states this codec is "*Lossless, with sampling rate of 24 Bits / 48KHz, digitized music remains accurate and dynamic with the utmost fidelity.*" This is just plain old wrong: aptX HD is not a lossless codec, and it does not provide the utmost fidelity.

If even the hi-fi companies can't get this basic level of information accurate, what hope does the consumer have of navigating what will be available from the much lower bit rates of Bluetooth LE?

Fraunhofer says that its LC3plus codec can achieve transparency (i.e. you can't hear the difference) for CD quality via Bluetooth LE, requiring perhaps only 96kbps to do so. That's just 7% of the original data, or 14% allowing for lossless data reduction. That's 86% of the CD-quality signal thrown away. But it's OK, they say, it sounds fine.

Do we believe them? Who did the listening? How did they listen exactly? I asked all these questions, and Fraunhofer very kindly gave me answers; it's one of the reasons this interview is so long. They even admitted that they themselves don't see the point in high-res audio at all; they just make the codecs because they're asked to do it, and 'lossless' in particular they regard as an irrelevance and indeed "100% marketing". That's from the people making the codecs!

Yet what of the high-res advantages of keeping filters implemented high up the frequency spectrum to ensure the audio band is free of phase effects? What of the impulse speeds that some say can only be achieved with true high-res sampling?

Is high-res audio a worthy goal for a good hi-fi system capable of reproducing it? Or are high-res files a waste of time, money and effort? Sony's engineers have implied this to me in the past, and Fraunhofer's have now stated it to me explicitly.

I know one thing. If you ever see a golden Japan Audio Society Hi-Res Audio Wireless logo on a Bluetooth LE product, take no notice of it. I reckon we'll be fossicking far into Furfieland on this topic for the next few years.

Cheers!

Jez

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Wilson's multichannel expansion

If Wilson Audio fans want cinema-like immersion, it would be easy enough to stick five or seven Wilson Chronosonic XVX speakers around the room for surround. But how would you position the middle one for the centre channel without hiding the screen?

Thankfully Wilson customers can relax, as the US company has updated its dedicated home cinema offerings with the release of two centre-channel speaker designs, along with a subwoofer and an upgrade of the Alida multi-channel on-wall speaker (above), together making the whole Wilson home cinema offering just a tad neater, if no less unusual.

Pictured right and top left is the remarkable new Mezzo CSC centre-channel unit, which clearly owes its origins to the 'WATCH' (Wilson Audio Theater Comes Home) Centre released back in 2000, the new model sporting twin 8-inch bass drivers alongside a 7-inch midrange (the Aluminum-Nickel-Cobalt QuadraMag midrange used in the XVX, no less), and a 2.5cm tweeter which is fully adjustable for alignment in the Wilson way. Of course the whole enclosure is constructed using Wilson's usual mystery V-Material, which is solid stuff: the 79cm-wide Mezzo weighs over 90kg. You can install the Mezzo CSC directly on the ground or raise the loudspeaker height on a short purpose-built column stand.

If the Mezzo looks a bit too alien for you, consider the more conventional appearance of the WASAE Centre (that's Wilson Audio Special Applications Engineering), a rear-ported loudspeaker engineered for on-axis centre-channel dialogue and music listening, equipped with twin 14.6cm mid/bass and a 2.5cm tweeter drivers (pictured above right).

While these centre speakers can operate with any Wilson speakers, the company has designed a model more friendly to home cinema use than its conventional floorstanders. Again the surface-mount (i.e. wall-mount or ceiling-mount) Alida CSC is clearly an evolution of the 'WATCH' surround speaker which was on Wilson's books from 2000-2009, then becoming the original Alida, now superseded by this new Alida CSC model, distinguished by the inclusion of the company's Convergent Synergy Carbon (CSC) tweeter, alongside a single 14.6cm doped paper pulp midrange.

A full system of those would require bass support, and Wilson already has subwoofers in its ranges, but now adds the new Submerge (below), an active model with 1600W of power pushing its full 12-inch bass driver. Front-facing controls allow easy adjustment.

All models are available in the full Wilson ranges of standard, upgrade and Premium Pearl finishes, which affect pricing, but the base-level finishes are priced in Australia as follows:

- **Alida CSC**: $31,995
- **Mezzo CSC**: $37,995
- **WASAE CSC**: $16,995
- **Submerge subwoofer**: $51,995

More info: advanceaudio.com.au

Three sides of Triangle Borea

France's Triangle has expanded its popular Borea speaker series with two new 'Connect' models, the BR02 Connect and BR03 Connect — though these are not to be confused with the BR02 BT and BR03 BT that launched in 2022, nor the passive Borea BR02 and BR03.

Confusion might be possible, since the BTs and Connects are very similar. Both offer Borea BR02 and Borea BR03 variants which are the same size (the BR03 is 36cm high), same weight (14.2kg), same impedance (8 ohms, 4.2 minimum), and same 165mm natural cellulose paper mid-bass woofer in the BR03. The internal power also remains the same, with 2 × 50W Class-D in the BR02, 2 × 60W Class-D in the BR03.

So what's different? We had thought the 'Connect' might mean networking had been introduced, but no: the only wireless connection remains Bluetooth, with the same Bluetooth 5.0 with aptX HD Low Latency protocol, which Triangle describes as "Lossless, with sampling rate of 24 bits / 48kHz". (This is not true; aptX HD is most definitely lossy, and as revealed by Fraunhofer in our big interview this issue, the Low Latency is achieved simply by cutting the length of the buffer in the sync device, here the speakers, reducing latency but increasing the chances of drop-outs.)

The upgrade here involves a new pair of tweeters, and a better set of input connections. The tweeter has changed from a 25mm EFS fabric-dome tweeter on the BT models to a silk-dome tweeter in the new Connects. And the new inputs are indeed potentially game-changing. There remain two analogue inputs, but where the 'BT' versions have a minijack socket for line level and a single analogue phono pair switchable between line level and phono level, the new model adds a third input dedicated to line level on RCA sockets. There's still one optical digital input and one coaxial, and the lossy Bluetooth aptX HD remains on board.

But the big bonus comes from the two new digital inputs — HDMI ARC, allowing connection to a TV or possibly monitor, and USB-B, which allows direct connection to a computer for real high-res lossless music.

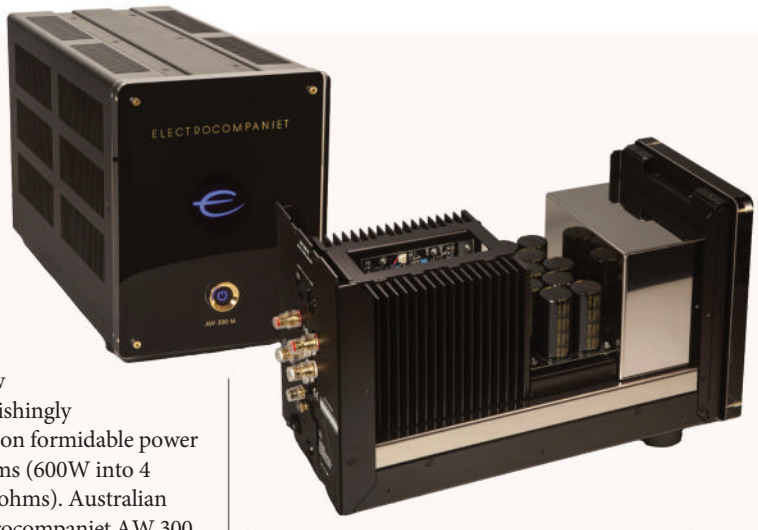
That gives the Borea Connects a new life flanking TV speakers or desktop monitors — two very useful scenarios for the minimalist hi-fi solution of active speakers.

There are also new colours available, with an oak in addition to the light oak option, and a new blue finish to come, in addition to Black, Cream, and Green. Pricing is $1250 for the BR02 Connect (the BR02 BT is $1000) and $1400 for the BR03 Connect (compared with $1250 for the BR02 BT).

More info: audiomarketing.com.au

Dark powers

Norway's Electrocompaniet has been using the long winter months to meticulously re-engineer its power amplification, resulting in the new AW 300 monobloc power amplifier, which comes in a new compact form factor, with a narrow frontage and extended rear chassis. Internally it adopts Electrocompaniet's direct-coupled high open-loop bandwidth topology, further enhanced in the new models with higher slew rates and extremely high-bandwidth amplifier stages. The power supply has undergone substantial enhancements, with 110,000µF supply filtering and an 800VA toroidal transformer. A novel output stage isolates the inputs and driver stages from the load, rendering the output exceptionally rigid and impervious to connected loads, an innovation Electrocompaniet says not only simplifies the feedback system but also ensures exceptionally low distortion, quoting a vanishingly low THD+N of 0.0006% on formidable power levels of 300W into 8 ohms (600W into 4 ohms and 1000W into 2 ohms). Australian pricing for a pair of Electrocompaniet AW 300 power amplifiers will be around $47,000.



More info: audiodynamics.com.au

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Yellow is the new Arcam

Or orange. You decide.

We often say of Arcam's hi-fi components that you can tell an Arcam instantly from its look. While the UK-based company's designs have evolved over the years, you'd never mistake them for anything else.

So the all-new Radia family is not only news in itself, but notable for defining a new look for the company, a revised aesthetic which Arcam describes as "purposeful yet playful", saying this will define the company's image for years to come.

With Arcam being part of Harman International since 2017 (and Harman itself wholly owned by Samsung), Arcam turned to Huemen, Harman International's in-house design firm, for the new look. The main design feature for the rebranding is the introduction of 'Radia Yellow', chosen for its contemporary look, its differentiation in the audio industry and its universal appeal.

"It speaks to everyone, everywhere," says Jason Gokavi, Principal Designer at Huemen. "Music is energy, and we wanted to hint at that energy by infusing the brand with a vibrant yellow that will be used throughout the product design and marketing assets going forward."

Of course designers do talk a lot of tosh (and the Radia Yellow looks distinctly orange in the pictures; it samples as having 40% magenta content), and we're rather more interested in what the new Radia products can do. It's a five-strong series of midrange components with three integrated stereo amplifiers, the A5, A15 and A25, along with the CD5 CD player and the ST5 network music player. All five sport the new sleek all-black design with subtle yellow-orange accents; the new aluminium chassis has distinctive vents cut into the amplifier tops, and a 'cowl' that hangs over the back panel to hide the connections. You also get a matching black and yellow remote control with each model.

The A5 and A15 amps are Class-AB designs delivering 50W and 100W into 8 ohms respectively, while the flagship A25 ups the ante with Arcam's own Class-G amplification design and 100W per channel. Class G implements multiple power supplies rather than just a single one, so that when a dynamic signal goes beyond the capability of the first power supply, the secondary supply is gradually brought in up to the full rated power output as required — it's a kind of turbocharging for dense or dynamic music moments, while still maintaining high efficiency in normal operation.

All three amplifiers share a "high-quality" moving-magnet phono stage among an otherwise fairly straightforward set of inputs; digital inputs are one optical, two coaxial, a USB-C on the highest A25 model, and Bluetooth, which is usefully available both in and out, so for streaming from a device and also for then listening on headphones, with aptX Adaptive available for both implementations. Surprisingly there is no HDMI ARC input, nor USB-B.

These digital inputs receive the attention of an ESS ES9018 DAC in the A5 and A15, while the A25 steps up to the ESS ES9280AQ chip. And while the rest of the family has frosted simplified TFT displays, the A25 sports an OLED screen and illuminated highlights around the volume dial that mimic the mere orange paint on its siblings.

The CD5 CD player supports USB-A playback for MP3, FLAC and WAV up to 24-bit/192kHz in addition to its core role of disc spinning.

The ST5 music streamer is well-equipped for the modern world with Wi-Fi, Chromecast, AirPlay 2, Tidal Connect and Spotify Connect, and we're delighted to see a redesigned Arcam App providing Amazon Music, Qobuz and global internet radio stations. Roon certification and MQA compatibility complete the exhaustive list.

One of the best things about the Radia range is its attractive pricing, with the CD5 CD player priced here at $1295, the ST5 streamer at $1495, and the three amps at $1495 for the A5, $1995 for the A15 and a jump to $2995 for the Class-G A25.

More information: **advanceaudio.com.au**

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*Note to libraries: this follows directly from the Nov/Dec 2023 issue; owing to an extended Xmas schedule there was no issue published including a January 2024 date.

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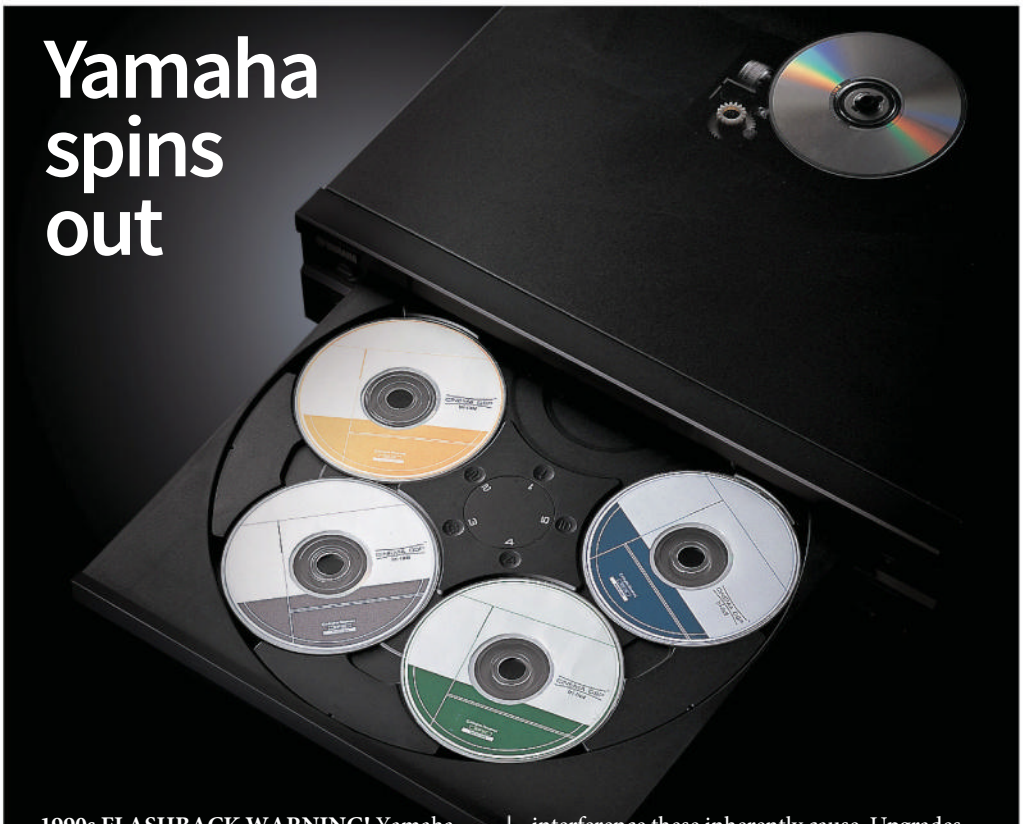
Yamaha spins out



1990s FLASHBACK WARNING! Yamaha is tempting us back to the silver stuff with a new five-disc CD changer that brings a twist to the classic carousel arrangement. Not only does the new CD-C603 let you play or shuffle through potentially 5 × 74 minutes of music, it has a neat feature called Play X Change, which allows you to change four discs while one is playing, guaranteeing a non-stop music party!

Such CD changers were originally about convenience, but for the new model Yamaha has also attended to the sound quality, including a 'Pure Direct' option as seen on Yamaha amplifiers and receivers, shutting down the digital audio output and turning off the display, thereby reducing the noise interference these inherently cause. Upgrades in the internal layout from previous designs also target performance improvements, as do the Laser Pickup Floating Mechanism taken from the company's single-disc players, and the Intelligent Digital Servo, designed to detect and compensate for any signal, tracking or motor speed issues.

In addition to the playback of CD, CD-R and CD-RW discs, the CD-C603 accommodates WAV and FLAC audio files up to 24-bit/96kHz through its front-panel USB input. The Yamaha CD-C603 is selling at $899, and is available in black or silver.

More info: au.yamaha.com

MQA bought by…

The Lenbrook Group of Companies — owner of NAD, PSB and Bluesound — has acquired the assets of UK company MQA, which had entered administration last year shortly after announcing SCL6, a new streaming codec which gained the Japanese Audio Society's Hi-Res Audio Wireless status (see also our LC3 interview p76). Lenbrook says its primary objective was to provide certainty for business and technical developments underway prior to MQA's administration — PSB has previously announced it is developing headphones which will use SCL6 and Ultra WideBand transmission, while Bluesound was notably the first multiroom ecosystem to support MQA files. MQA had amassed more than 120 licensees and several content partnerships; a new 'Lenbrook Media Group' has been formed "to drive commercialization of its media management IP and platforms, including BluOS, MQA, and SCL6."

Roon bought by…

Harman, the massive group of audio and more which includes JBL, Arcam and Mark Levinson, and which is itself a wholly-owned subsidiary of Samsung Electronics Co., Ltd, has now bought the music software company Roon. It is a 'lock, stock and barrel' purchase, and Harman is reportedly running it currently as an unchanged and standalone division. We gather that all monthly, annual and lifetime subscriptions remain valid, and "the familiar faces from our team will be right here as always". The development might grow the limited hardware that Roon has released.

A connection: both Roon and MQA grew out of developments from the UK company Meridian — MQA from its coding work and Roon from the Sooloos music discovery system Meridian acquired and developed in the 2010s.

New multichannel paths

We hear plenty about stereo audio codecs as they fight for dominance in Bluetooth use and beyond. But what if you're aiming to drive a multichannel set of home cinema equipment?

For home cinema the dominant audio format is Dolby Atmos, with DTS:X currently a very distant second. Some readers may also be aware of Auro-3D, a third immersive sound format formerly distinguished by the use of a 'Voice of God' speaker immediately above the listener (a concept seemingly limiting theatre design to a single seat, but there you go).

With the domination of Dolby Atmos, the other two companies are attempting reinvention via multichannel audio codecs.

DTS Play-Fi multichannel

DTS has expanded its DTS Play-Fi streaming platform to include immersive audio support for 12 channels, using the Wi-Fi of compatible televisions to send each channel to individual Play-Fi-equipped speakers and subwoofers. Originally launched in 2021 as 'DTS Play-Fi Home Theater' with support for 5.1 surround sound, the new update will enable Dolby Atmos and DTS:X soundtracks to play wirelessly to layouts of up to 7.2.4. The system also supports IMAX Enhanced, another brand under DTS's parent company Xperi Corporation; the IMAX Enhanced might be considered a trojan horse for DTS:X to win back a share of the streaming market. But IMAX Enhanced material is thin on the ground so far, available in Australia only on some Sony Blu-rays and with premium Marvel movies via Disney+ streaming — but Disney+ has been providing Dolby Atmos sound for IMAX Enhanced, not yet DTS:X.

In January 2023 both IMAX (DTS/Xperi) and Disney issued an announcement that Disney+ would start including DTS:X sound with IMAX Enhanced films in 2023. It's now 2024, we've just checked — and it's all still Dolby Atmos. 'Where's our DTS:X, then?', we asked Xperi. Their PR company 360+ replied noncommittally to our initial enquiry and then fell silent when we requested specific answers. No DTS:X coming, we fear.

Auro-CX

Meanwhile the company behind Auro-3D has been entirely reinvented following its total acquisition in July 2022 by the Saffelberg Investment group, and the founding of a new Belgium-based company, NEWAURO BV, with a new team and new ideas.

High among these is a whole new multichannel codec, Auro-CX. Most of the talk is of 5.1.2 or 9.1 (although CX also handles objects), but NewAuro is spruiking it primarily on the advantages of scalability across a variety of resolutions, from lossless to transparent to lossy using a single encode rather than multiple passes. The scalable sample rates allow a single bitstream to carry 48, 96, and 192kHz, giving the decoder the option to extract only what it needs from a single encode, depending on its capabilities.

As for compression, an example is given of getting 9.1 multichannel down to 384kbps streaming on a "perceptual" basis (presumably lossy with good listening results), but the best spec includes 24-bit/192kHz multichannel, requiring something beyond Bluetooth.

NewAuro is also renewing interest in classic Auro-3D formats, persuading Premium Sound to include free decoding in Onkyo, Pioneer and Integra models that feature more than 11 channels, along with an Auromatic upmixer to upscale lesser content. From the 'content' list on Auro's website, however, it appears that there are no movies available on disc in Australia with Auro-3D sound, although some global music releases include the format alongside others. As for Auro-CX, we hope soon to gather significantly more detail to report back in an upcoming issue.

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IT'S VEGAS, IT'S JANUARY: IT MUST BE...

CES

A revolution in automotive artificial intelligence, AI medical breakthroughs, AI smart toilets, AI kids' strollers, an honest-to-Betsy flying car from China, a mask behind which you can make silent phone calls (while looking quite frightening) — CES is a lot of things, and hi-fi these days is far less of a star turn than in days gone by, when the Venetian Tower was packed and there was a bonus high-end show down the strip.

But the music is still there, with some major speakers and electronics launched at CES 2024, along with announcements from key headphone brands and, gosh, even a personal cassette player.

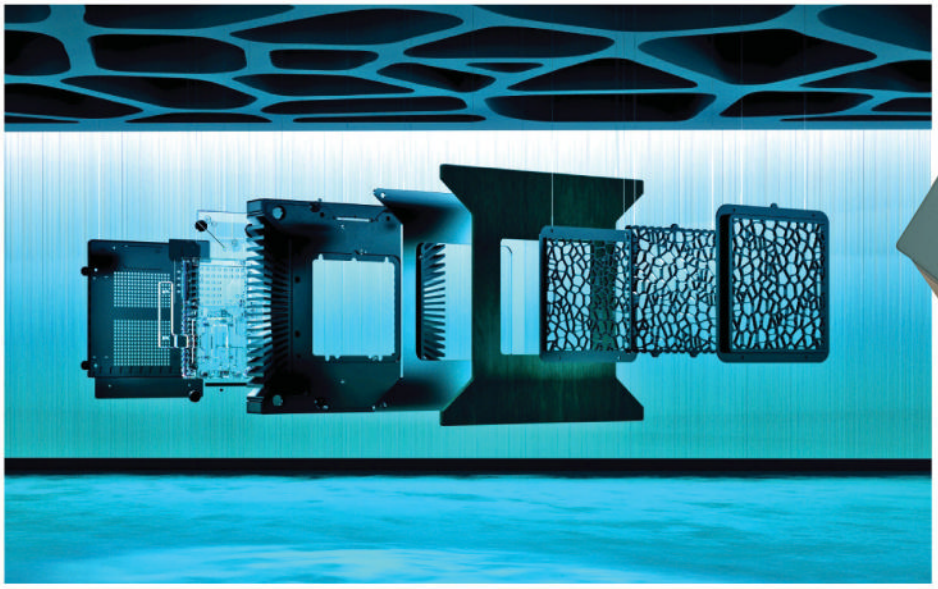
Meanwhile the AV never went away: CES remains the key annual launch pad for all the major TV players, and this year there seemed to be three key themes. First was 'size', of course, and 2024 is the year we will see 100+-inch TVs becoming real and potentially affordable things that are available in the local chainstore and specialist here in Australia. Second is quality, and here Mini LED continues to generate benefits which reach beyond the capabilities of OLED, although there is still a challenge in the new generation of QD-OLED, the screen technology which mixes one pixel of OLED light with two pixels of front-emissive OLED-QD light, to impressive effect.

Third there is the relatively new TV battleground of 'form': TVs with designer exteriors, roll-up TVs, a roll-up Laser TV, a transparent TV! — all providing new ways to integrate entertainment into our homes and lives. Here are some of the highlights from CES 2024.

LG Signature OLED T

If four-pixel OLED isn't quite keeping up with Mini LED on specs, the front-emissive technology can certainly flaunt its ability to achieve miraculously thin panels, and now one that is entirely transparent.

The idea isn't entirely new, but they've all been 'concept' models before. The LG OLED T is a viable product with a transparent OLED panel up front, which means you can literally see what is sitting behind it, plus a rollable black sheet which returns the screen to a more normal experience. No pricing yet but expect expensive, because it will be.



Roon Nucleus Titan

With Roon now part of the Harman group under Samsung, alongside brands like JBL and Mark Levinson, it was appropriate to see Roon using CES 2024 to announce a new flagship server, the Nucleus Titan.

Like Roon's previous Nucleus Plus, the new Titan is a dedicated server/streamer solution optimised to work with Roon's OS to deliver "bit-perfect playback" of a digital music collection, including high-res, to a Roon-compatible hi-fi system. Where the new top-tier server surpasses its predecessor is in performance quality and a self-cooling design with "silent, fan-less operation".

The Titan also sports two USB-C and two USB-A inputs, along with two audio-only HDMI ports. Internal storage comes in three sizes: 2TB, 4TB and 8TB. Expect pricing north of $5000, not including storage drives or a Roon subscription.

Sonus Faber Suprema system

The Italian brand closes its 40th anniversary year with the Suprema system, available in red, graphite or walnut for a mere A$1.4 million, your wedge netting you an external electronic crossover, two subwoofers, and two huge speakers each featuring eight front-firing drivers in a 4½-way configuration: four 8-inch woofers and an 8-inch 'link' mid-woofer, a 6.5-inch midrange, then a large 38mm silk-dome tweeter and a 20mm 'super tweeter' (the speakers reproduce up to 40kHz). Oh, and on the back there's a 4-inch midrange and 28mm tweeter, to "improve staging and dispersion".

Not only do they incorporate Poltrona Frau's Pelle Frau Impact Less leather, a chromium-free tanning process leather launched in 2022, the main speaker's chamber and its inner walls are rather impressively carved in recycled cork. But don't get any ideas: they still weigh 110kg each, and the subwoofers 103kg each, so it's unlikely they'll float.

Fiio CP13

Cassette decks have been turning up for several years now; Fiio's CP13 is the latest, following the form of the classic Walkman from 1979, no mean feat given many mechanism parts, not least the heads, were not easy to find. We expected A$300+ but Fiio pre-sales on AliExpress were A$156 delivered.

JBL Clip 5, Xtreme 4

JBL's portable audio line-up receives upgrades, notably to the new JBL Clip 5, Go 4 and Xtreme 4. We loved the previous Xtreme 3: the Xtreme 4 adds AI (shock horror) with an AI Sound Boost putting an AI algorithm in charge of analysing your music in real time and thereby knowing when best to attack. Sorry; we mean when best to optimise what you hear, promising a more powerful and less distorted sound. It's rugged, fully immersible with an IP67 rating, quotes a 24-hour battery life, and it is one of the first things we've seen to support Auracast in Bluetooth LE. Local pricing and timing to be advised.

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Hisense: 110-incher & rolling Laser TV

Hisense continues to forge a path beyond its former 'bargain' status, with all-new 2024 TV ranges with a firm focus on Mini LED, as mentioned in our review of the U8K this issue (see p30-32).

The new models will arrive sometime around Q2 of 2024, and for those keen to understand the complexities of TV model numbers, the key for Hisense is to know that 2023 was year 'K', while 2024 become year 'N' (we don't know what they've got against L and M), so the new Hisense ranges run from U6N and U7N, which use standard Mini LED, then the U8N models which use 'Mini LED Pro', and finally an update of the new toppermost 'UX' category, which has the very latest 'Mini LED X' tech. The main difference in the different Mini LED versions is their size (smaller the higher up the ranges you go) and their efficiency.

Top of the heap for 2024, then, is that UXN range, which rises to an immense 110-inch screen size with staggering numbers — 40,000 individually-controlled Mini LEDs, so equivalent to 40,000 zones, quoted as generating peaks of 10,000 nits (compared to a standard TV which might manage 500 nits).

We had been told earlier by Hisense that Australia would get sizes up to the 85-inch only, but the 110-incher is now confirmed (no price yet but it'll be HUGE), along with the promise of a far more affordable 100-inch TV in a 100Q7NAU model, which features 144Hz QLED but with standard LED full-array backlighting. No pricing for that either, but our guess would be under $5000, which is the current street price for the 100-inch U7 (RRP $7k).

Hisense has also trailed lower A7N models (entry-level 4K) and A4N offering full-HD in smaller screen sizes.

We look forward also to a new solar-charged remote control (with the panel on the front, not the back, like Samsung's), and the golden idea (perhaps taken from its appearance in some TCL TVs last year) of extra holes for mounting the TV stand, so you can choose between high and low positioning.

There was no word from the Australian team on whether or when Australia might get the impressive new Laser TVs shown by Hisense at CES: which were led by a flagship 8K Sonic Screen Laser TV, delivering 8K resolution (of perhaps dubious worth, though see the Samsung story) while also using the screen itself to deliver cinematic sound — 100,000-plus sound units, says Hisense, which is a measure we don't yet understand: individual actuators behind the screen? When we ever find out, we'll let you know.

Hisense also has a new entry in the race for new TV 'forms', with a Rollable Laser TV, where an ambient-light-rejecting screen usefully unfurls only when required from an integrated ultra-short throw projector.

There's an Ultra Slim 4K Laser TV, and finally an Ultra Black Screen Laser 4K, using new micro-nano anti-glare film technology and impressively collaborating with Barco to create a Dynamic Light Steering Laser TV, a technology "making efficient use of laser-generated light", supposedly allowing far superior HDR performance to standard projection. (Barco has also patented a hybrid projector architecture that combines steered and unsteered light.)

Samsung 8K & QD-OLED

Samsung has a new 8K TV, the QN900D, eventually to come in sizes up to 98-inch, loaded with what Samsung claims is the most powerful video resolution processor ever designed for a TV, and showcasing what Samsung calls its Infinity Air Design, with which the 65-incher claims to be the world's thinnest 8K TV screen, depth 12.9mm.

With regard to the need for 8K content, Samsung is helming the 33 members of the 8K Association, which aims to set standards and advance 8K content. Last year, Samsung released a teaser for *The Lord of the Rings: The Rings of Power* series in 8K, developed in collaboration with Amazon Prime Video, another Association member. Samsung notes there is growing 8K content on social media channels including YouTube, as well as digital artworks in 8K.

Samsung also has new QD-OLED TVs, and in some nice new smaller sizes, with the new S95D, S90D and a new more affordable S85D range to include a new 42-inch S85D and a 48-inch S90D.

TCL's 115-inch QM891G

Bigscreen TV winner this year was TCL's QM891G, taking 4K Mini LED up to 115 inches, with 20,000 dimming zones and a peak brightness topping 5000 nits. Add support for 4K/120Hz and 4K/144Hz gaming (though the panel itself is 120Hz) to those numbers, as well as a built-in 6.2.2-channel sound system with up-firing speakers and Dolby Atmos support, and the key question becomes: how much, and which markets? TCL says that the ultra-large TV category grew 600% for the company in 2023; we were recently introduced to the 98-inch X955, which goes for €6000 in Europe, while in Australia you can already get 98-inchers in the C845, C745 and C735 ranges, prices up to $9999. The new 115-incher is being promised "under US$20,000", so likely substantially over that number in Australian beer tokens.

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Leica Cine 1
Cinema TV

Home cinema through a new lens

Germany's Leica moves from cameras that capture moments to crafting cinematic magic with a 'Cinema TV'. And it's a beauty, both outside, and on the screen.

When we think of design icons in hi-fi and AV, we might turn first to Denmark, or perhaps the US, UK and Japan. But if you ask a photographer the same question, it's more likely to be Germany, and specifically Wetzlar, home to Leica Camera AG, makers of legendary cameras since Oskar Barnack at Leitz (as Leica was officially called until 1986) came up with the first commercially successful 35mm still camera. Since then, a full century has seen Leica delivering the finest, neatest and most famous imaging devices on the planet: legendary, gorgeous, and considerably expensive.

Its lenses are a key part of the equation. Leica's ability to deliver world-class glass has made its lenses legendary among photographers, and got Leica's cameras on NASA's shortlist for the space race. During John H. Glenn Jr's triple-orbit mission on February 20, 1962, he used a Leica Ig camera to capture the first human-shot colour photographs of the Earth from space.

So who better to put their lenses into the projectors that bring bigscreen images back to the home? As Leica puts it, its business is "moving people through imagery," and the Cine 1 allows it to deliver images to the living room as home entertainment.

Which is perhaps not too much of a departure for the company, if we step back a little in time. Photography has always been a form of home entertainment in itself, and in many 1960s and 1970s homes the biggest available imaging system would have been projection of 35mm transparencies mounted in slides, displayed up on a large square screen so much bigger than any available TV of the day that even the grainy Kodachrome family holiday pictures looked impressive.

Many was the home where this task was trusted to a stylish Leica/Leitz Pradovit slide projector, the height of home projection in its day, complete with a cabled remote control which allowed you to shuttle 35mm slide carousels across a smoky sitting room without even needing to put down the whisky tumbler.

Hence Leica sees the Cine 1 as representing its return to lean-back lounge entertainment. So welcome to 'Cinema TV', an ultra-short-throw projector with a TV tuner, smart streaming, and a built-in sound system. You can plug in external sources, but the Cine 1 could provide everything you need in one: it's a deliberate alternative to a television.

Not only that, it does so in style, with an instantly iconic exterior, looking functional but gorgeous, like the cameras — though the Cine 1 is four times wider than an SL2, at 60cm in width. The console really is so pretty that even if it did nothing at all we'd be happy to have its silver top surface motoring open and closed on command, that classic central red Leica dot central between its space-age Bauhaus curves. It's just a stunner.

Even the remote control is many cuts above the pack. Here the red Leica dot sits near the bottom, above it a shining silver plane and then not a viewfinder or a flash-gun attachment, but a set of silver buttons, the top left inscribed in dark red with the logo for 'Netflix'. It's a collision between a classic past and a bold new future. Or Netflix anyway.

Is it also expensive like a Leica? That depends on your point of view. In the consumer AV market the pricing of $13,999 for the 100-inch version and $14,999 for the 120-inch is certainly above any comparable competitor. But in a catalogue shared by a Leica Watch ZM 2 Monochrom at $23,900, or a 'Leica SL2 Vario (camera) Christmas Bundle' at $15,599, the Cinema TV prices fall more into line. 'If you want the best?', they're saying. It is, after all, a Leica.

To those Cine 1 prices you would be wise to add the price of a Leica-branded ambient-light-reflecting fixed screen, which is highly recommended both by Leica and ourselves, these currently selling for $2690 for the 100-inch, $3990 for the 120-inch, with other options available (see below), and to consider the offers of installation as well.

SUMMARY

Leica Cine 1
Price: $13,999

+ Excellent image quality…
+ …right across the screen
+ Gorgeous box
+ Full TV replacement

+ PVR functions limited; single tuner not triple
+ Price vs competitors

Inside, outside

So the Leica Cine 1 sees the German company reclaiming home entertainment territory long ceded first to Japanese companies, then Korean, now Chinese. And it is with one of the current Chinese technology leaders that Leica has partnered for its return.

Initial announcements of the Cine 1 termed it a 'Laser TV'; this has since evolved to 'Cinema TV', perhaps to disguise the partnership. But when it turns on and the screen doors open up to a VIDAA user interface, the connection with Hisense is clear. Hisense has already found success with this complete 'Laser TV' entertainment concept, so of course one must wonder exactly how much Leica has made this Cine 1 truly its own, and how much is primarily a recasing exercise. We asked Leica Australia's Shaun McMahon that very question.

"So Leica with Hisense — it is a technology partnership, effectively," he says. "We're offering them a bit of guidance in terms of lenses, and they're providing us with know-how in terms of the rest of the unit, including VIDAA. We're not going to supply Leica Summicron lenses to Hisense, that's where we stop short, but it is a collaboration."

As noted, then, Leica has applied its own external design to make the Cine 1 look so lovely and luscious. But it's Leica's lenses that are very much the crucial thing here.

Ultra-short-throw is hard

The lens quality is always crucial in a projection system, of course, but even more so in an ultra-short-throw projector, because of how it is positioned. The convenience of a projector placed close to the wall is undeniable, but the technical challenge of delivering an even spread of light and accurate imaging from such a position is considerable. Chief among the challenges is the quality of the lenses, both within the internal imaging system and especially at the exit lens, with its unenviable task of delivering a rectangular image thrown up from almost directly below the screen.

"I believe there are four main lenses being utilised in the Cine 1," says Shaun at Leica Australia, "all Leica Summicron lenses."

Leica has a long history (see panel below) and an almost unmatched reputation for producing high-quality optics, with its Summicron lenses using high-quality materials and being known for exceptional sharpness, even when used wide open, and for their ability to produce images with high contrast and rich, natural colours. Usually, of course, such Summicron lenses ensure the quality of image capture, whereas here the lenses are at the other end of the reproductive chain, rendering previously-captured images back into the real world with the minimum of distortion.

One interesting note is that the Cine 1 projector has no zoom abilities, nor even a focus ring; you simply put it in exactly the right place.

"Part of the reason they've gone for the fixed and not the tele is the fact that they wanted to use prime lenses," explains Shaun

Oskar Barnack at his desk at the Leitz Company, 1933.

From the City of Optics…

Back in 1849, a mechanic and amateur mathematician Carl Kellner established a small optical company in the German town of Wetzlar to make, firstly, telescopes and, later, microscopes. Known as the 'City of Optics', Wetzlar is in the German state of Hesse and about an hour's drive north of Frankfurt.

In 1865, the company hired a talented optical engineer called Ernst Leitz, who impressed Kellner enough to be quickly made a partner. Just four years later, in 1869, he took over the whole operation, renamed Ernst Leitz Optische Werke. Leitz was just 27, yet his entrepreneurial prowess saw the business expand rapidly, and this continued under his son, Ernst Leitz II, who famously committed the company to building Oskar Barnack's revolutionary compact camera (pictured). It was Barnack (above) who originally came up with the idea of using 35mm cinema film as a standard for still photography, doubling the single-frame format from 18×24 mm to 24×36 mm. Unfortunately, Leitz senior never saw the prototype of the compact camera reach the production stage, as he died in 1920.

As an interesting aside, during the 1930s and 1940s, Ernst Leitz II and his daughter, Dr. Elsie Kuehn-Leitz, both Protestant Christians, arranged for hundreds of Jewish employees and their families to flee Germany and escape the Holocaust.

The company's facility in the centre of Wetzlar continued to expand, but eventually it was decided to move the camera business to the nearby town of Solms, where it relocated in 1986. In the meantime, what had become the Leica Group subsequently split into three independents: Leica Camera AG (1996), Leica Microsystems and Leica Geosystems (1998). The latter two still operate from separate premises in the centre of Wetzlar, and Leica Camera has also since returned to its home town, in a new business centre on the out-skirts called Leitz Park. There is also a Leica Biosystems. While the companies share the Leica name, they are not linked and the red circle logo with white lettering is Leica Camera's distinctive version of the logo; the others use red lettering on white background.

McMahon, "which goes back to our photography, in that fixed lenses will give you the optimal performance, but you obviously have to have them set up specifically. A prime lens has a fixed focal length, no zoom — if you're shooting on a 50 mm prime lens you don't move the lens to zoom, you move yourself.

"So when the Cine 1 is calibrated for the 100 or 120 inches and set up perfectly, you should get the optimal performance out of those lenses. That's not to say we're not looking at doing some sort of telescopic lens technology in the future, because we are looking at expanding the range, that's something we're researching, but for the time being we've decided to play to our strengths and go with prime lenses on these two."

So the potential advantages of Leica-standard glass come from four sophisticated aspherical Leica Summicron lenses in combination, each manufactured according to Leica standards, and precisely matched to the image size here. Leica's own image processing is also employed — Leica Image Optimization (LIO). This brings 'special algorithms' to bear with the promise of "particularly natural colour rendition, richly detailed colour gradation and an outstanding contrast ratio".

Behind the glass is triple RGB laser technology and a DLP 4K imaging system with Dolby Vision HDR compatibility, able to deliver 3000 ANSI lumens, says Leica, and colour accuracy to more than 100% of the Rec.2020 colour space. It uses a 0.47-inch Texas Instruments DLP micromirror device with the XPR system of flipping its native 1920 × 1080 mirrors four times during each frame, thereby delivering Ultra HD's full resolution of 3840 × 2160 pixels.

Once you're up to Ultra High Definition, there's enough resolution to use a bit and lose a bit for the benefit of screen straightening, most commonly vertical keystone correction. But resolution is resolution; you want to keep it if you can, and you do so by getting the projector as perfectly positioned as possible.

This is doubly the case with an ultra-short-throw design. So while there is manual and even automatic geometric correction available via a smartphone app within the Leica settings here, your best option is to have the Cine 1 square in front of your screen position, out from the wall the perfect distance to have the image fit the 100-inch (in our case) screen width. Then adjust the revolving feet to get the picture perfectly rectangular — we needed the front feet rotated to lift them slightly higher than the rear ones. Indeed you will need to do all this initially at least roughly *before* mounting the screen on the wall, in order to establish the ideal screen position for your benched Cine 1.

Leica and Hisense are the only consumer brands we're aware of which will ship the matching screen with the projector. There is to be a range of options available from Leica Stores and authorised dealers, with screens that rise up, screens that drop down, even an entire 'Berlin' cabinet into which the Cine 1 can fit (though with not much ventilation to the sides, it looks). These are all in addition to Leica's own branded fixed screens, like the 100-inch model we were supplied (which we note is still labelled a 'Laser TV' screen). These fixed screens use an ambient-light-rejecting surface, and we'd highly recommend including one of these in your purchase. In our view this takes the projection performance instantly to another level. A good screen beats a mere wall hands down in providing better reflectivity, a truly flat projection surface, and in this case also ambient light rejection that gets the Cine 1 over the hurdle of daytime use.

The Leica 100-inch screen requires assembly, we'd say at roughly the level of your average flatpacked garden shed, similarly needing two people and a large space (larger than the screen) to lay it all out, burst all the plastic packages of screws and bits, and put it together. At times during assembly the delicate screen surface faces down, so a large protected floor surface is required. But the final result is a big wall-mountable screen, and a truly complete imaging system for your entertainment, not only the projection half of it. Never neglect the importance of a high-quality screen; you are hobbling your projector without one.

Build & facilities

We must pause again to appreciate Leica's gorgeous cabinet, which looks as stunning in the flesh as in pictures, its timeless style seeming entirely 21st century while still triggering thoughts of those Pradovits of the 1960s. They call it Bauhaus, but it's more sophisticated than purely functional, the matte silver aluminium housing perforated as it wraps around front and sides all the way to the connections bay at the rear, allowing the speakers beneath to do their stuff at the front, while four fans allow cooling ventilation to operate at the sides.

The flat silver top surface is split in the middle and is closed as a dust cover when not in use, sliding open mechanically when you press the power button either at the front right of the top surface or on the remote control. Once open and the triple lasers activated, there is a proximity sensor which interrupts programming with a warning not to look into the lens, even counting down to an auto switch-off. As we were poking around the back more than most, we found this warning being triggered rather too frequently for our purposes, so we found an option in settings to turn off this safety feature. Use it with caution, subsequently, naturally.

That connections bay at the rear is generous (for a projector) with its three HDMI inputs, two of which are HDMI 2.1, one of which is HDMI 2.0 — so use the former for gaming, since it can receive above 4K/60. HDMI 2.1 is also officially compatible for Dolby Vision and HDR10+ High Dynamic Range with metadata, though these should work fine through HDMI 2.0 anyway.

More importantly one of the HDMI sockets (number 2) has eARC, the Audio Return Channel, so that you could use this path — or the provided optical audio output — to attach a sound system larger than the one built into the Cine 1. Would you want to do that? Maybe. The sound system here is fairly capable, if something of a grey area in terms of specifications — there's a mention of 2 × 25W, which might imply it's straight two-channel, though it's elsewhere termed a four-channel implementation, so there may be something going on with regard to the Atmos configuration. Peering through the grille with a torch reveals small side-firing 30mm drivers in addition to the two forward-facing drivers (and the four large fans in total down the two sides; these operate remarkably quietly).

Our guess would be that the configuration here is delivering primarily a virtual centre from the front and wider two-channel from those side drivers, along with an Atmos-compatible processor and some level of Dolby virtualisation. That would certainly match the characteristics of the sound that we heard emerging from the cabinet (see below).

Third option for the sound — there's a minijack headphone socket, positioned rather inconveniently on the back; it would be better next to the USB 2.0 slot which is nicely accessible on the unit's left side; there's also a USB-A 3.0 slot at the rear. These can be used to power devices or for file playback, but also

for recording from the TV antenna. So this is not only a projector, a TV and a sound system; it's also a personal video recorder, though with limitations, as we'll see.

There are usefully two antenna sockets at the back for your free-to-air TV broadcasts, one on the standard TV coax connector and one on BNC. There's an Ethernet socket if you're not using Wi-Fi, and two different service ports. There's also a CI+ card slot round the back, which we gather is for non-Australian satellite usage.

The remote control is lovely; it is possibly plastic but it looks and rather feels like aluminium, with nice textured and raised buttons, and that red Leica circle below four dedicated buttons for Netflix, YouTube, Prime and Deezer. Odd to see Deezer there but these things are a combination of what the local market needs and who is happy to pay to get a button. Oh, and there's a mini (maybe half-price) one for Disney+.

There's voice control under a button here as well, and it was unusually effective; we find voice control on TVs often unpredictable and best avoided during programming, as the wrong command can cancel everything and send you to YouTube. Here we could reliably call up inputs, streaming services, even single programmes. "Find *Welcome To Wrexham*", for example, found the programme rather than setting off a Google or YouTube search for the town, as an Android TV might do.

And as we found, this remote control can operate current Hisense TVs, and vice versa.

"Remember that Pradovit slide projector we grew up with in the 1970s? It's still working. So think of the years of entertainment you could enjoy from a Leica Cine 1."

Setting up

We've covered some of the setting up: position the projector to establish the screen position, then install the screen, and carefully tweak the projector position physically, before using either the manual or auto geometric correction options, if you need them at all.

As with all ultra-short-throws, you'll find that to fill the 100-inch diagonal screen, you'll need the projector body surprisingly far out into the room. In our case the back of the Leica was about 28cm from the wall, leaving the front a full 65cm out; the more important measurement may be for its front feet, since they need to be on your benchtop — they are some 60cm from your wall, so you need at least that depth of bench. That's pretty deep — go measure your own TV bench now. So you could do what we do and have it on a sturdy moveable stand, rather as we did our Leitz Pradovit slide projector back in the day, but here much closer to the wall. (Note that we've seen Leica set-up literature with errors in the numbers, putting the back of the Cine 1 at 37cm from the wall; this could only be right if the projector is 26cm deep, and it isn't.)

Ultra-short-throw projectors commonly suffer from the 'bump' effect — not the bumps that exist on rendered walls, though USTs certainly suffer from those being accentuated from a light source below, which is why a screen is so important with UST designs. No, it's that they stick out so far into the room that people can bump into them, and their alignment is then thrown all off. This is quite a pain with carefully-aligned ultra-short-throws, but unusually we found it extremely easy here to resquare the image on the screen compared with previous ultra-short-throws we've tested. When speaking to Leica they seemed to think that positioning was tricky, hence they have an installation service available in Sydney, Melbourne and Brisbane and through dealers elsewhere. For putting that screen together and mounting it, we'd certainly be considering paying the professionals. But getting the Cine 1 itself into position we found so easy that we took to sliding it out of the way on its trolley during periods it wasn't in use.

We thought perhaps this was made easier by the Leica's relatively large size, but also, we decided, because the image here is straighter than from any other ultra-short-throw we've used. That upfiring geometry is so hard that the top of the picture from a UST projector is invariably slightly curved compared with a longer-throw projector, and often even in the middle area, so that a long pan across countryside, say, can have a slightly nauseating bulge as it moves. Here we could see none of that, only the slightest curve to the top line of illumination, invisible behind screen masking.

Smart TV

So, easy enough to get back in position, and for those using the Cine 1 as a TV replacement, chances are that the projection unit and its screen will be in more constant use, and won't be going anywhere. This is, remember, a fully smart TV, with TV tuner and networking for its smart operating system. As noted the operating system and user interface is VIDAA, as used in Hisense's Laser TVs and televisions, and other than the menus to control the actual projector functions, this 6.0 version of VIDAA seems identical as in the latest Hisense TVs. Which is no bad thing, as VIDAA is a very good interface, attractive and clear. Its main screen keeps physical inputs away under a virtual or remote button, while the top third of the initial screen offers a two-pane choice of 'VIDAA Free' or VIDAA App store.

'VIDAA Free' is something rather less than the 'free' content served by competitors such as TCL and Samsung, or by Hisense itself on its own TVs. During our use this section simply collated some recommendations of content from Tubi, ABC, Plex and, er, 'Toon Goggles', and only a total of 81 titles in all. The free 'live' channels you get on a VIDAA Hisense TV seemed not to be available.

So for content you're far better off surfing the many many apps to which VIDAA app store gives access. Some are preloaded, others you'll need to search and install. There are four of the five network catch-up apps — ABC, SBS, 9 and 10, but not 7play. And there's pretty much every streaming service except Binge, Kayo and Foxtel, who we gather wouldn't extend VIDAA's licence for these services to a third-party user, perhaps als explaining why the live 'VIDAA Free' channels are also absent. All this is a bit curious, really, since VIDAA often proclaims its pseudo-independence from Hisense, and that should make Hisense a third-party user too.

Workarounds for those missing services? When we searched the app store for Binge, VIDAA instead offered instead a web browser which we thought might just work for streaming — but we couldn't test it, as the onscreen keyboard didn't include the '!' required for us to enter our Binge password.

Your other option for content is to stream it across; there's AirPlay available for one, which can be used for screen mirroring from a Mac. This worked great for our own videos and YouTube; rather annoyingly Binge, like Netflix, seems to block AirPlay video streaming of its shows as soon as we started, so there are limitations here too.

All such limitations can be surmounted simply by plugging in your laptop (or a media player) via HDMI. HDMI will also provide top-level visuals and sound from, say, 4K Blu-ray, so we attached a Panasonic 4K Blu-ray player to the Cine 1 and settled back for some serious viewing time.

Viewing & listening

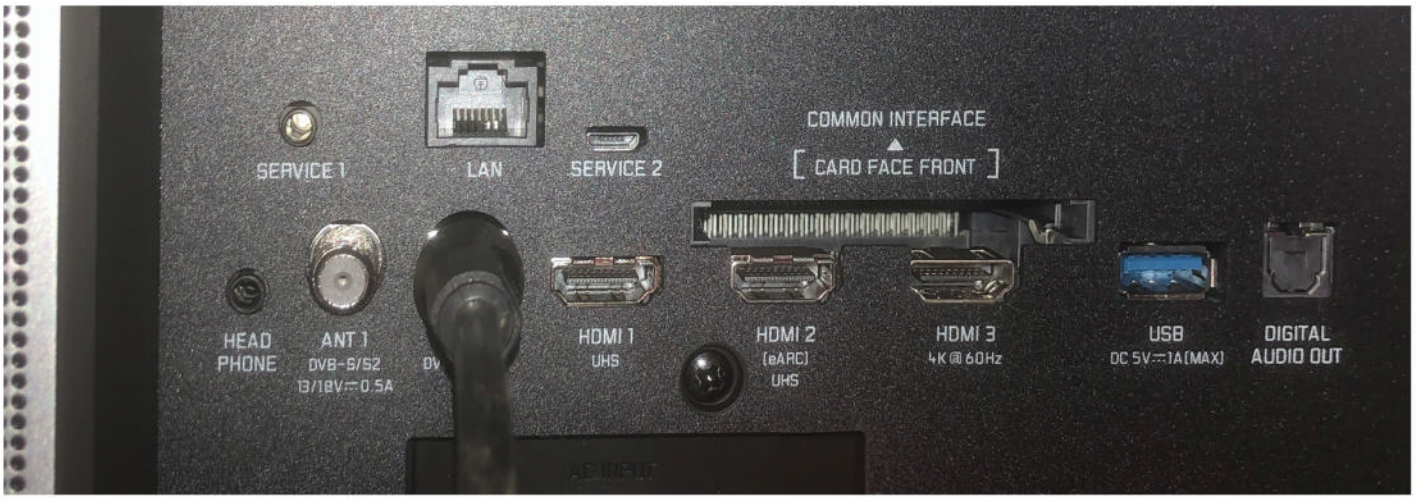
This is one of the larger ultra-short-throw projectors to have come through our test room, and we have never had one so able to banish ambient light effectively. This is assisted by the ambient-light-rejecting screen, but is also down to the projector's inherent brightness, and perhaps the lack of loss through those higher quality lenses. We used it with a standard 100-inch screen as well, and between screens we found that even straight on the wall it still had enough in the way of illumination to deliver a fully bright cricket match (Australia v. Afghanistan) even with a good deal of diffuse ambient light in the room.

We had attached our roof antenna and set the Leica off on a scan of our free-to-air — just a little slower than average, to find 39 channels and 21 radio stations. The free-to-air channels defaulted to 'Cinema' picture modes, which have a useful choice of Cinema Day and Cinema Night, depending on your circumstance, and again the brightness was enough to deliver day-time TV more than watchably, though not, obviously, with the contrast you enjoy in a darker room, let alone that of a TV screen. This is just as well, since the fixed and UST nature of this projector means you can't do the normal projector thing of bringing it closer to get a smaller brighter image when it's not bright enough during the day.

To make a comparison with previous reviews, in this room we find the ambient light, when not blocked off, to defeat most 3000 lumen projectors until near-dusk. The Leica was fine to deliver an image at midday with anything less than direct sunlight on the screen. We could leave *Pointless* running in the background as we worked and occasionally glance up in amazement at the vastness of Richard Osman on the 100-inch screen.

This ability to deliver during daylight is a huge advantage for a product which is positioning itself as an alternative to a TV rather than being a 'special event' projector. Most UST rivals fall short on this crucial criterion, nor do they have TV tuners built-in to make casual daytime viewing a possibility.

During those daylight hours the projector inevitably loses something in contrast and colour to a good television. But it gains vastly in the size of its presentation. Breakfast TV is



The Cine 1 is stocked with inputs more like a TV than a projector: three HDMI inputs, one with eARC, two antenna ins, two USB-A slots, and optical out.

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The top rear is motorised and slides open when the Cine 1 is powered on, so protecting the exit lens from dust when not in use.

enormous. True crime shows are downright alarming. The impact of Oliver Stone's *JFK Revisited*, streaming from SBSOnDemand, was only magnified by such, er, magnification.

Especially once the day fades. Definition and clarity are then exceptional, no doubt again assisted by the quality of Leica's glass. Menus are as laser sharp as the light source suggests, and when we plugged our demo 4K images into the USB-A slot, the DLP four-flip process of XLR seemed to be revealing perfect sharpness down to a two-pixel level for 4K and an impression of single pixel resolution, with seemingly zero misalignment between colours here nor, as noted, any dearth of brightness from the time segmentation of the four pixel positions. Most impressive of all here, perhaps, was that the separation of two pixel lines remained equally clear all the way to the corners of the test image, a real sign of the quality of Leica's lenses. The black test slides also showed no notable greying out of blacks anywhere on screen. In a darkened room, black bars above the movie should seem perceptually full black.

Such attributes yield simply beautiful images. National Geographic's *Secrets of the Elephants* (Disney+, 4K, Dolby Vision, 5.1) is full of thrilling photography across five different elephant habitats, and it expands magnificently to the big screen through Leica's Cine 1. Bright but realistic forest greens, the deep detail in textures of elephant skin, the ability to see details even in shadows, and the impact from the screen size (near-lifesize elephants!) took this great doco series to the next level.

Going back to free-to-air TV, we did try recording onto USB. This is not detailed in the manual, so you're on your own, and it's confusing, because you're encouraged to use the green key to pop up the full Freeview Plus guide, which is indeed good for picking a show, if a little crude in appearance.

But this guide doesn't let you record anything. Instead you need to press the remote's 'Guide' key for an entirely different programme guide, with a cleaner if less colour-splashed layout, from which you can indeed record to a stick of your choice. From the literature and website, this should be a triple tuner, able to potentially record two networks other than the one you're watching. But we found it allowed only one recording at once, showing a clash when we tried a second overlapping recording, and switching channels just prior to a recording. That indicated a single tuner, not a triple, which came as a surprise to Leica Australia, but they have now confirmed that our Australian model seems to have been given one tuner not three, perhaps due to our unique broadcast requirements.

The PVR otherwise worked reliably, though there's no 'series record' options and finding options like deleting recordings took us a while. So if you really want a fully-functioning PVR, we'd suggest attaching something along the lines of a FetchTV which will make the job rather easier.

Whatever the configuration of that sound system, it did well, and its Dolby Atmos compatibility did seem worth having. The first soundtrack which really burst to life was the first disc we played from a physically-connected 4K Blu-ray player. *Paddington 2*

"Breakfast TV is enormous. True crime shows are downright alarming. The impact of Oliver Stone's *JFK Revisited* was only magnified by such, er, magnification..."

(on 4K Blu-ray) proved a delight both visually and sonically. If the sound system here is indeed two-channel only then it did an extraordinary job of providing crisp central stuff for dialogue and effects — for the bear and his banging bucket, say — while delivering the music soundtrack entirely separately in a wider soundstage of some depth.

There are sound modes available for selection. 'Theatre' bigs things up best, and can at times spread things remarkably wide: witness the moment of imagined applause for Hugh Grant 26 minutes into *Paddington 2*, achieving remarkable immersion here without the slightest loss of dialogue intelligibility.

The degree to which you can fully appreciate these effects will depend on your room; they are best appreciated fairly close and immediately in front of the projector; obviously those seated to either side will enjoy increasingly less stereo effect. The clarity and separation also softens with room effect as you sit further back, and there are limits of slight compression if you take it up to higher levels; things can get shouty.

But it's comfortable up to enjoyably full levels, and Atmos soundtracks are devliered with still more clarity; just don't expect too much. Lesser soundtracks, of course, sound less well separated, and can even get a little boxy; switching to a less bassy sound mode can help clarify this.

Overall the sound is far better than almost any flatscreen TV will give you, and the match of most mid-price soundbars. Looking at the space available for the sound system — really just the front few inches of the chassis — it's as effective and room-filling as you could expect. This is perhaps one area that might be developed further in a premium all-in-one product like this, to create something equally special in the sonics as on the screen. Imagine if Wetzlar spoke to Wedemark or Erlangen, so that Leica's optics were combined with Sennheiser's Ambeo or Fraunhofer's upHear. Leica does call this a 'Cinema TV' after all, and big sound is a big part of real cinema.

So there's still room for a sonic upgrade to a full-scale stereo or surround sound system here, which would more magnificently support the excellent bigscreen images here.

Because visually, too, *Paddington 2* was a feast of detail, colour and motion. Such detail! — Paddington's own ever ruffling fur is artfully animated and detailed, but so are real-life elements like the grey straw hair seemingly plonked on Julie Walters' head during a reaction shot in the courtroom, the softness of her fluffy beige hat leaping out, with two clockwise-woven braids in colours both strong and accurate, not to mention Walters' finely etched (and not-too-craggy) skin tone or her deep purple bathrobe jacket with slight wear-marks visible on its thick pile.

This 4K Blu-ray also delivers Dolby Vision High Dynamic Range, and this had triggered the Cine 1's Dolby Vision picture modes automatically. There are several Dolby Vision presets and customisation available, so we brought colours out of any shift to warm back to neutral, and reduced the Ultra Smooth Motion setting to just 'smooth', which was enough to entirely eliminate a slight frame judder when this setting was entirely off. There are many motion challenges in *Paddington 2* — the water in the muddy river of the opening, the fence railings as he cycles around Windsor Gardens, the barbershop sequence, the window cleaning: it's like a demo disc with a plot. The processing here passed muster almost every time — just those pesky fence railings we couldn't stop strobing a little in the background even when we manually tweaked the deblur and dejudder settings individually. There are auto and force-video settings available in the menus here, though no force-film mode.

Leaving discs behind, we switched to the internal smart VIDAA interface to watch examples from the streaming apps. Disney+ programming with Dolbies Vision and Atmos proved similarly impressive. We rewatched chunks of *Get Back*, marvelling again at the quality obtained by Peter Jackson's team from the original 16mm footage. We watched the finale of *Welcome To Wrexham* S02 twice on this system, the handheld match footage almost disorientating when writ so large, but the interview headshots rendered with every pockmark and eyebrow hair sharp, every detail in that extraordinary celebratory street parade captured for the record — and all this even though the show is only HD, not 4K (a reminder that 2K is not so very far behind 4K in most circumstances).

One setting we liked very much — as soon as you press the 'menu' button on the remote, the top option is 'Audio Only', which blanks the screen to deliver audio only. (The screen comes back on as soon as you press another button.) For those who like playing music through apps on their smart TV, this is a huge boon, allowing you to enjoy the music without a screen blazing away. Sometimes even the best screens need to be turned off.

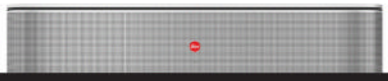
Conclusion

The consumer ultra-short-throw projector category came of age once they were reimagined as a TV replacement, with streaming dongles and built-in speakers. Hisense took the idea to another level with its Laser TVs, and now Leica has taken those Laser TVs to another level, principally by upgrading the lenses, but also the look, creating a premium product which we reckon will attract higher-end buyers as much with its product design, which is so gorgeous, as with its performance, which is pretty thrilling, even overcoming a good whack of ambient light, though reaching its ultimate best in a darker room.

The VIDAA interface is excellent; the laser light source boasts 25,000 hours of service life; the whole thing seems to use less power than a comparable TV, and yet you get the best and brightest ultra-short-throw image we've yet seen. What's not to like? The PVR section was the only bit which disappointed

And as for the price, well, it's no secret that good lenses are not cheap. Plus the thing looks like an instant design icon, it's the best we know in its category, and hey — it's a Leica.

One last thing: remember that Pradovit slide projector we grew up with in the 1970s? We had it out recently, and it's still working. So besides the company's preeminence and prestige, you can hopefully look forward to a long future for all that rolling entertainment up there above the Cine 1's red Leica dot, providing long-term immersion for your movies, streaming, gaming, even *Pointless*, all writ large up there on the big Leica screen.



SPECS

Leica Cine 1 - 100 $13,999

($14,999 for 120-inch version)

Fixed screen: $3690 (120-inch version $3990)
Projection technology: TI 4K XPR DMD, triple laser
DMD: 0.47-inch, native resolution 1920x1080
Screen resolution: 4K UHD, 384 x2160
Light output: approx. 3000 lumens
HDR modes: HDR10+, HLG, Dolby Vision
Contrast ratio: ~1000:1
Dynamic contrast: ~2,000,000:1
Throw ratio: 0.25
Inputs: 3 x HDMI, 2 x USB-A, 2 x antenna in, tuner, AirPlay, Bluetooth, screen mirroring, Ethernet, Wi-Fi
Outputs: HDMI ARC, optical digital audio, minijack headphone out
Smart TV interface: VIDAA 6.0
Dimensions: 600 x 378 x 149mm
Weight: 13.6kg

Contact: Leica Australia
Telephone: 03 9248 4444
Web: leica-store.com.au/cine1

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Hisense 65U8KAU
$2499

Luminous precision

Seeing out its time in Mini LED Pro glory, the 65-inch U8K shows Hisense moving from its traditional value niche into full performance that challenges all comers.

SUMMARY

Hisense 65U8KAU
Price: $2499

+ Consistent strong image
+ Good blacks and local dimming
+ Image pings in Standard mode
+ Excellent VIDAA interface with extras
+ Gaming features

– Less impact in HDR modes
– TV sound lacks dynamism

Hisense is a company which embraces various TV technologies. It has had OLED televisions on its books in the past, though not in its ongoing ranges: instead the top sets are now firmly focused on Mini LED, with locally-dimmed groups of increasingly small LEDs behind a conventional LCD panel.

Mini LED is proving itself both under review and in the market, delivering (at its best) higher brightness levels than OLED, and beating it on dynamic range, the number of stops between the lowest level of detail in near-black shadows and the brightest white in an HDR desert sun. Our Sound+Image award-winners have been led by Mini-LED winners in the last couple of years.

The relative cost of Mini LED can be seen in the difference between pricing for standard LED. Reviewed here is the 65-inch U8KAU, the Australian version of the 65U8K, which is currently priced at $2499 (as we write; obviously these things can change). Hisense offers two other Mini LED 65-inchers below this, in the U7K and U6K ranges, but once you forgo Mini LEDs and drop to normal LED, the 'A' series pricing drops to just $1299 for a 65-incher, with street pricing under a grand.

So two questions — why pay more within Hisense's own range, and how does this U8KAU compare with Mini LED rivals from the likes of Samsung, Sony and TCL?

The mystery of ULED

The first question is easier for us now than it was when we started, because we sat down with Hisense Australia near the end of this review to untangle the ranges and specifically the company's widespread but often seemingly random application of the term 'ULED'. We were once told ULED was entirely a marketing term rather than a technology description, but various bits of Hisense literature have rolled back on this, either attempting to place it on a scale below QLED or, in one extant Hisense UK blog, still maintaining it means 'Ultra-light emitting diode'.

We think we now have this straight, at least as favoured by Hisense locally. ULED describes a raft of technologies that are applied to the company's TVs, and once a certain set of requirements are all ticked, Hisense calls it ULED. It's nothing much to do with actual LEDs at all.

We also endeavoured to clarify the variety of different Mini LED versions from Hisense. There is simple 'Mini LED' in the U6K and U7K models. There is 'Mini LED Pro' on this U8K (which is 4K resolution, we should note; the '8K' in the model number here is just a name). And there is now also a new UX series (UXAU here) which brings something called "ULED X Mini-LED X".

The differentiation is primarily down to LED size and the number of zones into which they're grouped. The U7K, for example, has 10,000 individual LEDs grouped into some 100 zones. The U8K reviewed here has its 10,000 LEDs grouped into more than 500 zones, we were told, which might indicate 576 zones, though we've read 1008 zones elsewhere, but anyway more than six times the number of zones in last year's U8H, so the backlight control is now far more detailed. The peak brightness of the backlit panel is

The VIDAA interface is snappy and comprehensive, and comes with free live channels of 'VIDAA TV'.

around 1300 nits; there's no figure given for full-white brightness.

Beyond this TV's Mini LED Pro there is Mini LED X, described as "the apex of backlight technology"; the current UX series has no 65-incher but a 75-incher at $4999 (compared with the 75-inch in this reviewed U8K range at $3499). Here some 20,000 LEDs of a superior type reside in as many as 5000 zones, for incredibly tight backlight control.

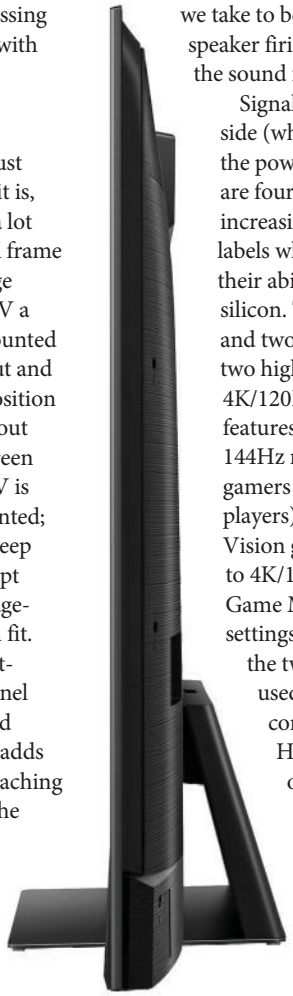
Next year's models are already announced via CES, due to arrive mainly in Q2 2023 (see *News* p18). The latest LED X models go to 85 inches and a huge 110-incher, with 40,000 LEDs and zones, supposedly capable of insane 10,000 nits brightness. It's clear that Hisense is making a move to be recognised as much for high technology and premium performance as for its market stance hitherto of being one of the bargain Chinese brands.

We note from the specs that this is not a 10-bit panel, rather 8-bit+FRC, as has become increasingly common on TVs well as monitors. This FRC 'Frame Rate Control' is a dithering technique that has pixels rapidly alternate different colours to display the expanded colour range of HDR. Meanwhile 10-bit HDR metadata (and beyond) is achieved by using the TV's quad-core Hi-View Engine and its 16-bit processing of the back lighting in combination with the LCD panel's own pixel control.

Build & facilities

Putting aside comparisons, we can just enjoy the 65-inch U8KAU for what it is, and does. Hisense has certainly got a lot right with the design. The thin metal frame and fabric-covered thick bottom edge with front-firing speakers give the TV a premium look, and the centrally-mounted metal pedestal extends only 10cm out and is low enough to relatively easy to position a soundbar if you want — there's about 9.5cm between the bottom of the screen and the furniture upon which the TV is placed. It can of course be wall-mounted; the panel itself is only around 8cm deep and all plugs connect sideways (except optical and Ethernet), so cable management won't prevent a relatively flush fit.

This Hisense 65-incher is no lightweight, however. Lifting the 26kg panel from the box is a two-person job, and attaching the substantial table stand adds another 5kg. The instructions for attaching the stand took a little studying, but the procedure proved easy enough once the panel was laid flat down on its own box, protected by the little foam strips padding the screen. Two sturdy metal stand sections fix together, then onto the TV, while a third piece slots onto the back to cover things up and to provide useful cable management.



This all leaves the back of the TV quite pretty, with some sculptured lines in the plastic and a central feature made of what we take to be the grille for the 'subwoofer' speaker firing to the rear, underpinning the sound from those front speakers.

Signal connections are all on the left side (when looking at the front), with the power socket on the right. There are four HDMI inputs and, as seems increasingly common, they all have labels which indicate differences in their abilities and/or levels of HDMI silicon. Two are standard HDMI 2.0, and two are HDMI 2.1 spec. Those two higher-spec HDMIs support 4K/120Hz, VRR and ALLM gaming features (in fact, the TV can support 144Hz refresh rates — not for console gamers but appealing to some PC players), and the TV also has a Dolby Vision game mode that goes right up to 4K/120Hz. There's also a dedicated Game Menu that puts game-related settings at your fingertips. One of the two HDMI 2.1 ports is also used for eARC, playing TV and connected audio down the HDMI cable to a soundbar or AV receiver, so audio-enhanced gamers take note you'll have just one input left for everything that a PS5, Xbox Series X or gaming PC can throw at it.

We've already mentioned Dolby Vision, and the U8K also supports HDR10, and HDR10+. While HLG broadcast-flavour HDR isn't mentioned in the Australian specs, that may be because we don't have any to receive here; it's listed in other markets.

Viva VIDAA

The U8K seems to have a GoogleTV operating system in the US but Hisense is focusing increasingly on its VIDAA platform in Australia and the UK. While we are fans of Google TV, VIDAA in the 7.0 version (7.5 by the time the TV left us) is also an excellent interface, logically laid out, and very snappy in use on the U8K — rock-solid indeed — and packed with apps with which to stream content, some pre-loaded, others requiring a quick search and install process.

VIDAA is wholly-owned by Hisense, the local Hisense team tells us, though when we talk to VIDAA themselves they claim a degree of autonomy, founded in 2019 by the Hisense Group aka Qingdao Huatong State-Owned Capital Operation Co. Ltd (we love Hisense's early name of 'Qingdao No.2 Radio Factory'), but VIDAA is now headquartered in Atlanta in the US, and works with others including Germany's Loewe (who will tell you that VIDAA was built on Loewe code stacks), while more recently Leica's Cine 1 ultra-short-throw projector 'Cinema TV' has been released with VIDAA as its operating system.

The main VIDAA app store covers all major paid streaming providers, every terrestrial catch-up app except, strangely, 7plus ("working on it", says the local team, and see below), and then a great many assorted extras from useful likes of Tubi and music streamers.

A solid central stand adds to the not insubstantial weight of the U8KAU itself... The remote control is a full-size wand with voice input, very easy to find your way around.

There's not the massive range of Google's store, so you can't rely on some specialised tech app being available, but it certainly covers all genres, and you'll never want for something to explore.

Especially as there are also VIDAA channels — live streaming channels, and not premium content, obviously, because it's all free, but with 129 channels running when we first did our count, though later it dropped back to only 22, so no guarantees! At its busiest there were TV movies, music channels, Watch Mojo and Party Poker! This last was showing 16:9 content squeezed to 4:3, and the U8K's setting for aspect ratio was locked off ("Not available for current signal or application"), so no way to fix that — very tall playing cards it had to be. With many of the channels, ad breaks promote either the channel itself, or ads for Hisense TVs — when you've just bought one! It's like Facebook showing you ads for hotels in Broome because you've just been there on holiday.

There's also VIDAA Art (pictures from Deviant Art which rotate on various themes, no control over transitions or speed), and Bolt+ TV, an extra service which turned up during our testing. Once you've opened a free Bolt+ account it gives access to still more channels both commercial and amateur (many of them gaming, since via Bolt+ you can easily start your own live-stream). Some of Bolt+'s channels are semi-premium — news channels, soccer club channels from across Europe including the Premier League (not matches).

Not forgetting local live TV, of course. The U8K scanned the airwaves fairly slowly (finding all the channels in the first few seconds then very slowly finding no more), after which the Green button on the remote opens the 'Freeview' section. This brings up a TV guide which can go both forward and back in time; selecting a show from the past indicates whether it might be available on catch-up TV — *including the missing 7plus*, which works fine this way, though not with its usual full-screen menus: just select any Channel 7 show on the Freeview guide then the 7plus option, and navigate to something else.

As we discovered recently when using Leica's VIDAA interface, there is an entirely different TV guide that comes up under the 'Guide' key of the remote. It's more sophisticated if less colourful to look at, less functional in most ways, but it does allow the U8KAU to record TV shows onto a USB stick. It's a single tuner only, so you can only watch/record one show at once.

We had thought there was, strangely, no direct access to live TV from the remote or the Home page, but under the Inputs tab, you access live TV by pressing 'Vidaa TV' to go to your last broadcast channel. If you press 'Vidaa TV' on the remote, it goes to the last Vidaa TV channel (e.g. Party Poker). But it's actually a continuum; scroll through channel numbers and after GemHD on channel 95 you go up into the 1000s or 4000s for the Vidaa TV channels.

Anyway, while Freeview is theoretically outside the VIDAA system, the TV as a whole provides everything you could possibly want, and probably more of it than you really need.

The four HDMI inputs, twin antenna inputs, one USB-A and the headphone out are all side-facing, although Ethernet and optical connections exit to the rear in a separate bay behind.

Picture performance

In terms of picture presentation, the U8KAU will default to various screen modes based on what's coming in. Starting at the top of the quality tree, when we fed it Blu-rays and 4K Blu-rays from an attached disc player, any movies with Dolby Vision would trigger the TV straight into Dolby Vision IQ mode, ditto DV content from streaming providers. The 'IQ' mode of this adjusts Dolby Vision settings based on a light sensor to judge the room conditions; the lighting results were OK, but as the credits rolled on the Blu-ray of *Sex & Drugs & Rock & Roll* (Andy Serkis as Ian Dury), the credits were both yellow and a bit juddery. Hisense thankfully doesn't lock off its HDR modes (some do), and there's an extra slot for Dolby Vision Custom, under which we added the lowest level of motion interpolation and a neutral colour setting, a combination which gave excellent and widely-applicable results.

You can tweak modes for all inputs first and then tweak individual inputs afterwards, and of course you may wish to tweak individual modes too. On the whole our tweaks were just for motion smoothing and HDR colour, with sharpness reduction in most circumstances. High-quality content was easily optimised, and the best of it could

really ping in Standard mode; high-quality demonstration content showed the rich detail available in shadows, sharp edges delivered without ringing, impressive contrasts into areas of full brightness, and no visible banding even on relatively low-res content.

We reduced processing as much as possible before checking subtitle blooming — tests showed absolutely no spread beyond the last illuminated pixel, speaking well to the resolution of the Mini LED backlighting; there was just a little yellow creep into the right edges of bright areas.

Full-colour test screens showed pretty much zero dirty screen effect, just a fade to grey on the last half dozen pixels on each edge, most notable in the very (very) corners; this counts as excellently-uniform delivery and yonks ahead of either side-mounted or non-mini LED backlight performance. There can be a further slight colouring of corners due just to viewing angle if you're within a couple of metres, but it's not from screen colouring; it's all full white when straight on.

In real circumstances, with sensible screen modes, the U8KAU actually proved a relatively reserved performer. With AppleTV+'s extraordinary black-and-white Dolby Vision *The Tragedy of Macbeth* (Dolby Vision Custom, neutral colour, Smooth) the richness is there, the detail is pinsharp, the edges finely drawn thanks to the lack of blooming. When Lady Macbeth is called away from the window her hair and gown edges shone bright with backlighting but did not quite sizzle with it as we've seen with more in-yer-face HDR contrast from other mini-LED TVs at this level. It's an over-simplification to ascribe this to panel brightness, since we'd chosen processing which damps things down. Some does so rather extremely — the 'Clear Motion' option, for example (not available in Dolby Vision mode) is wildly dimming, presumably since it splits the image in the time domain and perhaps introduces blanks to smooth things further. If you have motion issues this may help, but its darkening effect means we'd only advise it in a dimmed room.

The lack of extreme contrast does not make this any less enjoyable a TV. The picture is thrilling nonetheless; witness the colours and shadows and lighting of *The Buccaneers*, showing in 4K on AppleTV+. The opening scene of the first episode is also an excellent motion tester with a series of long pans; again just two notches of custom judder reduction and one of blur were enough to render this series to perfection, and just look at the colours on that title slide!

Sound & sundries

You can't expect too much from a modern TV in the way of sound, and we'd certainly recommend an external sound system here to achieve full clarity of dialogue and overall scale of sound which would be suited to a picture of this quality. But the U8KAU's sound system does better than most TVs, assisted by that rear driver and genuine forward-facing drivers at the front. The sound is full within its limits of never expanding beyond the screen; we noted no height effect from the advertised upward-firing drivers, even when playing genuine Atmos material.

Other notes — the U8KAU shows a white light on the front when it is powered down, and a red light when it's on. Call us old-fashioned, but this did our heads in! We kept thinking it was on when it was off, and vice versa.

The remote control is a good one, a full-size TV wand, though the Hisense brand on the bottom section is, like the controls in a Douglas Adams spaceship, black on black, so that it's rather hard to see the Hisense name unless the gloss stylishly catches the light against the matte background. Nicely subtle, yes, but unhelpful in a household with multiple remote controls, where the brand mark is the essential identifier.

We also checked the USB slot to confirm successful playback of a wide-range of file-types, in addition to its own recordings. We used this input to display our test 4K slides, showing two-pixel resolution to be perfectly separated, and single pixels also fully delineated in most modes, most clearly in those with minimal processing.

Conclusion

Hisense has a fine TV in the 65-inch U8KAU, and the VIDAA interface provides all the essentials and a wealth of extras so you're getting a true entertainment centre as much as a mere TV. More to the point, all the little things worked, and worked well, and we had a sense that with this year's models there's a coming of age for Hisense as a TV company, unarguably now a competitor against any brand, not merely the budget offerings.
While we have seen more dynamic Mini LED presentation from rivals on HDR content in particular, remember that Hisense has already trailed the updated U8NAU for Q2 2024 (see *News*) with significant upgrades even over the screen technology here, which the U8KAU combines with the TV's other merits to deliver reliable and easily tweakable 4K SDR and HDR performance, while the lack of blooming around bright objects from the backlighting proved exceptionally low for sharp edges and generally dazzling performance.

Given the timing, end-of-year bargains may become available — which might leave you torn between this year's bargain, and next year's upgraded tech!

SPECS

Hisense 65U8KAU $2499

Screen technology: Mini LED Pro backlit LCD with QD

Screen size: 65 inches (75-inch is $3499)

Screen resolution: 3840 x 2560

HDR formats: HLG, HDR10, HDR10+, Dolby Vision

Inputs: HDMI x 4 (2@48Gbps HDMI 2.1), composite AV (minijack), USB 2.0, USB 3.0, Ethernet, Wi-Fi

Outputs: optical, headphone

Interface: VIDAA 7.0 (7.5)

Gaming features: 4K/120Hz, VRR, ALLM, Dolby Vision game mode

Built-in audio: 2.1.2-channels, Atmos-compatible

Dimensions (hwd): 914 × 1452 × 300mm with stand, 1452 × 858 × 78mm without

Weight: 31.5kg (with stand), 26.5kg without

Contact: Hisense Australia

Telephone: 1800 447 367

Web: hisense.com.au

Welcome to the Sound Field

Yamaha says its latest combo fully immerses you in a sonic globe, a big claim for any soundbar system. Is it exaggerating?

Over the last few years Yamaha has completely rebuilt its soundbar offerings. Gone are the likes of the YSP-5600B which won our Sound+Image Awards in 2018 with its final reinvention of Yamaha's unusual 'Intellibeam' concept where literally dozens of small drivers (46 of them in that final model) were used to create a wide soundbar soundfield, even beaming sound to particular places in the room. Those YSP bars worked well — but weren't particularly affordable.

Since then Yamaha has gone the other way, producing mini-miracle soundbars with relatively minimalist driver counts, achieving prices as low as $279 for a bar alone, or even more remarkably including a wireless subwoofer for as little as $399.

Last issue we reviewed Yamaha's new soundbar range-topper, the 'True X' system with little wireless rears, or without the rears as the True X Bar 50A. That True X system is $1599, still a grand below the asking price of those former Intellibeam giants.

There's also a yawning gap between the True X kit and the lower smaller bars far below.

That gap is now filled with this new model, the Yamaha SR-B40A, at a recommended retail price of $649. So could this be a sweet-spot of performance for Yamaha's soundbar range, with relatively affordability, yet including the best abilities of True X?

Build & features

This package arrives in the usual 'chair'-shaped box containing the long soundbar and the tall wireless subwoofer. It reminded us of the subwoofer with the Yamaha bar below this, the $399 C30A model with a compact bar, but doing the maths the subwoofer here is significantly bigger — a full 1.7 times larger in volume, and 2.4kg heavier too. Its driver is larger

SUMMARY

Yamaha SR-B40A
Price: $645

+ Solid dynamic performance
+ Simple set-up, easy use
+ Good Atmos in 2.1

– Oversells on immersion
– No separate HDMI input

Yamaha SR-B40A
soundbar + subwoofer

at 165mm (6¼-inch), and it has double the output power available, quoted at 100W with no envelopes on measurement provided. It is, in fact, very close to the subwoofer which comes with the True X system. And it claims a frequency response down to 33Hz, though again no envelopes stated, so those lowest frequencies are likely -6dB down (one-quarter full volume) on the main bandwidth.

The bar, meanwhile, is not one of Yamaha's compact bars, rather a good 91cm wide and just 68mm high, thereby not impinging on most modern TVs, other than those which drop their screens right to the benchtop. There is also the option of wall-mounting the bar, which comes with brackets for the purpose. Its depth when wallmounted is 139mm, the spacers and brackets adding 6mm to its 133mm depth when benched.

So a larger bar, and a larger subwoofer — so far, so straightforward.

The other jump in performance over the lower-level Yamaha soundbars is the inclusion here of Dolby Atmos processing. Just to remind ourselves what that means: something which processes Dolby Atmos does not necessarily deliver all of which Atmos is capable. Supporting Dolby Atmos does not necessarily mean you get the height component of Dolby Atmos; it doesn't even mean you get surround sound. Dolby Atmos scales to whatever system receives it, whether multichannel, stereo, or even mono.

So there can be a mismatch between public expectations of Atmos as an immersive format, and this sort of lesser Atmos delivery from products with no real height or surround components — such as soundbars like this B40A. So manufacturers should make the actual abilities fairly clear, we think.

Dolby Atmos is still a useful inclusion, though, even on driver-limited bars. We regularly find that switching to an Atmos soundtrack delivers clarity beyond stereo or 5.1 inputs, even when there's no sense of the wider soundfield.

So Atmos inclusion is good, unless a company uses it to claim some impressive immersive performance which the hardware can't deliver. Does Yamaha claim immersive sound from this front-only soundbar and subwoofer? It most certainly does — witness the graphic shown below, which is animated as a ball of audio sources on Yamaha's website, with the blurb saying "*A brand-new immersive experience*"... "*fills every corner of your room with expressive sound*"... "*fully immerses you in a sonic universe*".

The animated graphic even shows the B40A creating sound from below the listener, something which no home cinema system of any size or magnificence has ever achieved, to our knowledge. Even Dolby hasn't got around to putting speakers on the floor yet.

Yamaha advertises the combination of True Sound and Atmos as creating a 360° sphere of sound around the listener. Clever, if it can.

Impressively, then, the soundbar is going to achieve this with just two tweeters and four circular midrange cones specified at 46mm diameter. Our highly technical torch-and-ear technique nearly failed us here, so dense was the bar's covering fabric, but the drivers look to be positioned all along the front, with two midrange cones at each end and then a tweeter on the inside of each pair, only slightly smaller, perhaps 35mm. Yamaha confirmed there are no upfiring drivers on this soundbar, though we could spy two large circular holes in the top, as if waiting for drivers which might perhaps be installed for another model, but they could conceivably be deliberate ports, or even some cunning passive pressure waft upward. The holes certainly leak sound.

But it's clear, then, that this soundbar and subwoofer plays in 2.1 — stereo with a subwoofer (a 16.5cm driver). Central elements such as dialogue will be shared by left and right channels — what's known as a phantom centre. Any other offer of delivery beyond stereo must be purely processing, not real supported channels. Yamaha's graphic sphere looks increasingly like a marketer's misunderstanding of the bar's Atmos abilities.

There is one magic trick which Yamaha might employ to achieve a larger soundfield, and that is the company's long history of measuring real venues and then simulating their soundfields. Those aren't offered explicitly here, but as on the True X bar there is an extra sound option for Atmos. If you hold down the 'Movie' button for three seconds, three white flashes from the bar confirm you now have a different 'Setting 2: Sound characteristics for the Dolby Atmos decoder'. The effects were interesting (see below).

What about DTS and DTS:X soundtracks? What indeed; as with many other manufacturers, they are no longer supported here.

So if it's Atmos we want, how do we get it? Streaming services on your smart TV will offer it — Netflix, Disney+, Stan, AppleTV+ and Prime, also Apple Music and Tidal, though for some of these you need to be in their top plan to get the Atmos, and you may need to persuade your TV's settings to pass Atmos to your soundbar properly.

The top way to get Atmos is from discs: a Blu-ray or UHD Blu-ray player can deliver uncompressed Atmos soundtracks, compared with the much reduced versions delivered by streaming services. For this reason we like to plug our disc player directly into a soundbar; avoiding the TV is a safer sonic path. But here you can't, as there is only one HDMI socket, this being to connect to your TV's ARC-compatible HDMI socket, thereby playing all the TV sound to the soundbar. There is an optical input as a fallback for those without ARC or with ARC compatibility issues, but that's it — no analogue fallback input and no direct input HDMI socket. Yamaha clearly sees this as a simple-to-use soundbar solution to plug and plug with your TV. All other sources connect to your TV and play down the HDMI ARC to the soundbar.

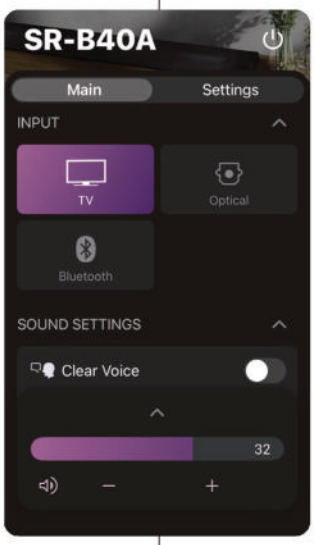
Setting up & listening

We are often sensitive to a subwoofer 'pulling' bass to its position, and so giving the impression almost of separate bass and treble sources. This system integrated well, perhaps because the bar is of a reasonable size and can meet the sub at a relatively low crossover, relieving the sub of the higher frequencies which can cause the directional effect.

The subwoofer ports to the front and fires to the right. Subwoofers are always best kept as central as possible, but this driver arrangement allowed us to put it usefully far to the left (not right, as in the main image here). We had it positioned two metres west of the soundbar when listening four metres from the bar, and it still all pulled together nicely as a system. We also ran this soundbar in a smaller room, to see if it helped immersion (and to try a second TV). In a smaller room, keep the sub far more central to keep integrity.

Inputs are simple: just the HDMI ARC connection to the TV, optical as a fallback, and Bluetooth for control and music streaming.

Positioning sorted, this bar needed hardly any set-up: HDMI to the TV, two power cables for the bar and sub, set the TV's sound to ARC output and Atmos-compatibility. We were listening to Atmos from Disney+ within minutes. We knew the bar was getting Atmos because if you press 'info' on the remote, one of the front lights goes green if Atmos is getting through; useful! And it sounded wildly dynamic. While we may scoff at the globe-of-sound illustration, that doesn't prevent the B40A being a great-sounding soundbar system within its less immersive limits. The opening of the new Indiana Jones movie was packed with detail — a ticking clock, distant explosions, then a barrage of action with a spread of sound definitely beyond the bar when in 'Movie' mode, while stereo kept things within the confines of the system. When Indy gets interviewed (by the Nazis, natch) in the opening scene, the speech was clear if we had things way up high, the music and effects leaping out, but at lesser levels any male speech could be a little hard to catch. You could add 'Clear Voice', but this tonally sharpens other elements too. You could drop the subwoofer level to de-muffle the voice, but again that affects everything. Or you could try those two 'Movie' settings by holding the Movie button for five seconds. One flash of lights confirms Yamaha sound, a little thicker than the official Dolby settings, the crossover perhaps higher, so that the Dolby settings in this case opened a little space, allowing the dialogue more clarity. But Yamaha's options seem to push the bass a little deeper. It's a setting worth trying if you're losing speech intelligibility, often an issue on action movies with loud bangs and music. There's a Bass Extension option too, but we doubt you'll need it other than for very bass-light material.



More Atmos from the marvellous sound design of *Avatar: The Way Of Water*. The swirling majesty of the underwater scenes is created using music with high frequency tinkling cues that create space, along with quite minimal and midranging underwater sound effects. It sounded great from the B40A, especially when we were in the smaller room — let's be clear, there was no up and down, or front to back, no spinning globe of Atmos, but the sound was certainly involving, rich, full, and easily tweaked to any particular preference using the remote control.

There's also an app available, called Sound Bar Remote (shown above); this talks to the bar via via Bluetooth and allows input and mode selection, along with useful visual feedback on what you've chosen.

Some bars have too many modes: here we like the simplicity: use Music for Music, and Movie for Movies! There is Bluetooth streaming to the bar to play music (SBC and AAC codecs only), but you could equally stream music from your TV. We were able to play from Apple Music losslessly, and potentially in Dolby Atmos, from an AppleTV connected to the TV. For stereo music, it was no surprise to find that the 'Stereo' soundfield delivered the cleanest and most natural sound. But not always the most enjoyable; the 'Movie' field could 'big up' music rather nicely, though we would notch the subwoofer down to tame the over-enthusiastic bass in that mode. This mode enlarged the effect of simple and clean arrangements — Leo Sayer's *Raining In My Heart*, for example — at the slight expense of thinning and boxing the vocal tone. The 'Standard' mode is somewhere in between, and sometimes a happy medium. But more complex mixes — the post-break section of *Leave It* by Yes for one, became both mushed and shrieked up in Movie mode, so that yes, to be sure of a listening session that proceeds without offence, stick to the 'Stereo'. (And leave the 'Game' well alone.) The B40A is then remarkably musical for a soundbar, also remarkably loud without offence for a soundbar. Atmos music was a level above, way more open and clear, requiring Movie mode, and to our ears always better (more natural) with the magic Atmos button engaged, not Yamaha's own default characteristics.

We also found ourselves riding the bass levels with music (especially between modes), as we had with TV and movies, but that's OK, the subwoofer levels are right there on the remote, and so prominently positioned, indeed, that you'll probably be using them once in a while by mistake instead of the adjacent volume buttons. But you'll know when you do it, because of what happens.

Conclusion

We ended with maximum available quality: UHD Blu-ray player plugged into the TV, with the 4K Blu-ray of Baz Luhrmann's Elvis playing in pure uncompressed Atmos through to the bar. And there was a moment, a snatch of an echoey *Suspicious Minds* two minutes in, which almost sounded to come from somewhere other than the bar. True immersion? Hardly. But Yamaha's 2.1-channel soundbar and wireless sub doesn't need the furphy: it's a great package on its own merits — with extremely easy set-up and ease of use, while producing solid and dynamic sound at an impressive price, especially when you can give it an Atmos signal. +

"True immersion? Hardly. But Yamaha's 2.1-channel soundbar and wireless subwoofer is a great package on its own merits."

SPECS

Yamaha SR-B40A $645

Connections: HDMI eARC, optical digital, Bluetooth (SBC/AAC)

Drivers: 2 x 25mm tweeter, 4 x 46mm cone, 1 x 165mm (subwoofer)

Dimensions (whd): 910 × 68 × 133mm (bar); 194 × 419 × 407mm (subwoofer)

Weight: 2.9kg(bar), 8.1kg (subwoofer)

Contact: Yamaha Music Australia

Telephone: 1800 805 413

Web: au.yamaha.com

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T2 W - Wi-Fi Turntable

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Reshape your vinyl listening experience

AUDIO-TECHNICA AT-VM95HIFI SET
CARTRIDGE AND ACCESSORY BUNDLE

This bundle release of three different cartridges, each with a different stylus profile, shows how easily you can literally reshape your vinyl listening experience.

When you're navigating the intricate world of hi-fi turntable cartridges, stylus shape emerges as a pivotal factor influencing audio performance. The shape of the stylus determines how well it fits into the groove — a shape that better matches the contours will increase how much of the groove's surface area is contacted, so reading more information and delivering a higher level of detail from the record. The separation between channels, the range of available frequencies and the level of nuance you'll hear from your vinyl are primarily influenced by the stylus and its interaction with the coils of its cartridge.

Entry-level or midrange turntables come with the cartridge chosen and either

VM: CLOSER TO THE MUSIC

Audio-Technica recently celebrated its 60th anniversary, a longevity borne from both diversity and an ongoing history of innovation in technologies. Working out how to implant a diamond needle without crushing the tip of a pipe cantilever was key to its initial success in cartridges, while in the 1980s the company's commercialisation of PCOCC (single crystal high-purity oxygen-free copper) allowed any number of products to take a step forward in quality.

The 'VM' in Audio-Technica's VM cartridges stands for 'Vector Magnet', a key innovation beyond the traditional single-magnet cartridge that was patented by the company and introduced in 1967. The VM's design uses two magnets arranged as a 'V' that mimics the original cutting process of a vinyl record, so aiming to precisely match the walls of the stereo record groove to the very best ability of the chosen stylus profile. The Dual Moving Magnet design delivered improved channel separation, extended frequency response and better tracking, leading to a long line of VM cartridges highly regarded for their ability to achieve nuanced and detailed hi-fi reproduction.

The full AT-VM95HIFI Set comprises three cartridges that provide an upgrade from the popular green AT-VM95E, together with a three-bay cartridge storage case and a stylus-cleaning gel pad.

pre-installed or supplied in a universal mount ready to be screwed into the tonearm. That makes it as easy to replace or switch the whole cartridge shell as is it to slide in a fresh stylus. A cartridge or stylus upgrade can be one of the most cost-effective and sonically-effective changes to be made to a vinyl system. It also affects how much wear is made on the vinyl record. Some shapes are designed to distribute pressure more evenly across the groove walls, reducing wear and extending the life of both the record and the stylus itself.

THE VM95 UPGRADE PATH

Audio-Technica's cartridges are favoured by many third-party manufacturers as well as appearing on the company's own wide range of turntables, and the long-proven VM95 cartridge series is a favourite, the AT-VM95E particularly popular. This uses the green stylus in the series, widely used and praised for its value, versatility and broad compatibility. This cartridge sells for around $80 alone, or $130 with its universal headmount.

So if you have one of those on your turntable already, the new Audio-Technica VM95HIFI Set brings you three stylus upgrades, each one in a cartridge and the same universal headmount, so an easy swap-over in mere seconds. And the upgrades are considerable, with the individual headmounted cartridges selling alone from $219 to $379 each. The new package provides a saving on the three cartridges purchased separately, plus in addition you get the AT6003R cartridge storage case, and the AT617a stylus cleaner, a small cylinder of polyurethane gel into which you can dip your needle.

SHAPING YOUR MUSIC

Each of the Audio-Technica cartridges employs a different stylus shape — elliptical, microlinear, and Shibata. Each brings distinctive characteristics.

The elliptical stylus of the orange VM95EN, with its broad surface, serves as a reliable workhorse suitable for a diverse range of musical genres.

The microlinear stylus of the red VM95ML, with its enhanced precision, caters to audiophiles seeking heightened detail and transparency.

The meticulous design of the Shibata stylus on the brown VM95SH caters to those with a refined taste for intricacies in music, providing an unparalleled depth of sonic expression.

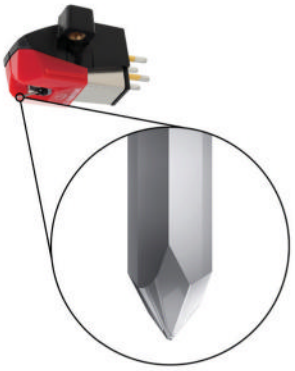
Easy choice — always use the Shibata, right? That's where cost also becomes a consideration. For day-to-day playback you may find the reliable elliptical 95E or 95EN cartridges more than serviceable. Upgrade to the 'ML' for critical listening, and perhaps save the Shibata for very special occasions.

And that's the whole point of this bundle in a nutshell. The stylus of the day can become a subjective journey, influenced by individual preference, the complexity of musical genres enjoyed, and the desired level of fidelity. Each stylus shape, each cartridge, imparts a unique sonic fingerprint — literally shaping the vinyl listening experience.

AT-VM95EN

0.3 x 0.7 mil elliptical nude

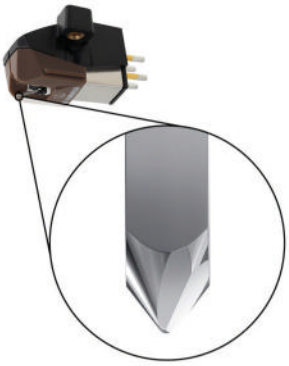
In general terms the elliptical stylus is a classic and widely adopted design, resembling an elongated oval. Its broad contact area with the record groove offers stability and durability, making it a popular choice for entry-level and midrange cartridges, also striking a balance between tracking precision and the minimisation of record wear.



AT-VM95ML

2.2 x 0.12 mil Microlinear

The microlinear stylus represents a refinement in design, providing a slimmer but more elongated line that increases contact with the record groove, enabling a higher level of detail retrieval and reduced distortion. Audiophiles who prioritise nuanced sound reproduction, particularly in intricate musical passages, may enjoy a microlinear stylus for the more accurate and transparent audio presentation it can bring.



AT-VM95SH

2.7 x 0.26 mil Shibata

Named after its Japanese inventor Norio Shibata, the Shibata stylus takes precision stylus design to another level. This stylus shape boasts a fine line contact with the record groove from its extended triangular form atop a nude-mounted square shank. The Shibata stylus excels in extracting minute details from the vinyl, ideal for intricate musical arrangements and demanding sonic textures, where its advanced design minimises groove distortion and yields a refined and articulate sound signature.

Sonus faber Duettos
wireless active speakers

Just add music

Take a pair of Italian-designed speakers and add amplifiers, streaming and external inputs including HDMI. Presto! — a complete hi-fi and TV system. You just decide how to input your entertainment.

SUMMARY

Sonus faber Duettos
Price: $6995

+ Well-implemented wireless speaker
+ Gorgeous sound
+ Great looks

– No direct input selection (yet)
– Can't defeat auto power down
– 'Hidden' settings

When we first visited Sonus faber's product page for the Duettos (they've since changed it), it was led by an artily-faded image of a young couple facing a pair of these luxurious-looking speakers on their dedicated stands, flanking a leafy bay window. The couple are touching, apparently held rapt by the music, although they might possibly have just nodded off. Anyway, superimposed over all this is a block of colour with the company's first statement about the Duettos which reads: "*The sound of Sonus faber, now wireless*".

And really, that is so much the story here in a nutshell that we were worried for a while we might find little more to add. Everything else is just adding detail to that statement.

Although that assumes you know what they mean by 'the sound of Sonus faber', of course, and there's quite the tale of Italianate artisan craftspersonship behind that.

And then there's that wireless bit. Wireless speakers, they're pretty exciting in themselves, a potential all-in-one system solution, since you get the amps and streaming all built into the speaker boxes. The word 'wireless', of course, means they can receive signals through the air without cables. But wireless is a generic term, not telling you what technologies are available for wireless music transmission, nor crucially how the speakers talk to each other, which is equally important in terms of the final quality available from the system.

So does wireless here mean Bluetooth? Or perhaps Wi-Fi?

Well for some of the stuff here, wireless means something else entirely, something new for consumer hi-fi products. Between the two speakers the Duettos use Ultra WideBand transmission — UWB. And that's the most exciting thing we've heard all this issue.

Build & design

Before we get all gooey over UWB, however, let's get hands-on with the physical Duettos, and see how they use more conventional

Bluetooth and Wi-Fi to access your music, before using that UWB to spread it around.

It's almost redundant to say that these are beautiful loudspeakers, because they're Sonus fabers; the company doesn't make anything else. Up in the rarefied air of Arcugnano, a town in the province of Vicenza, Veneto, north-eastern Italy (also home to Bertagni, Italy's oldest filled-pasta producer), Sonus faber has a four-decade history of making artisan-style speakers back to the early designs of Franco Serblin. Its factory is a wondrous mix of traditional skills and new technologies, where over the last decade or so Sonus faber has been part of first the Fine Sounds Group and, since 2015, the McIntosh Group, alongside Sumiko cartridges and McIntosh itself. But this has not dented Sonus faber's Italian approach, indeed the wider funds may have helped this, as in 2021 when it acquired De Santi Woodmaker, a family-run carpentry business with which the company had already enjoyed a 35-year collaboration, bringing these "two leading 'Made in Italy' realities" under the same roof.

These skills, this legacy, is evident in the appearance of the Duettos even before you plug them up and start playing. One common characteristic of the brand is what Sonus faber calls a 'lute-shaped"' cross-section, here the shape of the leather-covered top panel. This shape is said to serve both aesthetic and acoustic purposes, minimising internal standing waves and resonances within the cabinet, reducing coloration and distortion. The cabinet and custom-designed heatsink "guarantee timbre and musicality", says Sonus faber, which eschews mere neutrality in favour of its "signature Natural Sound".

There are two finishes: Walnut (above right), and Graphite (left). Our review pair were in the gorgeous walnut finish, on which the wood veneers have been laid to put the grains at unusual opposing 45-degree angles, so meeting at 90 degrees above and below the diamond-shaped speaker baffle, the bottom of which the grain tracks near perfectly. There are various warnings supplied about not cleaning the veneers and the leather top with aggressive chemical products (these apparently include lemon juice and wine); indeed don't use any cleaning products, is the advice, other than Sonus faber's own Cleaning Kit available from distributors. Really, a regular wipe with a soft dry cloth should be enough.

The black combined diamond baffle is something we recall from a Sonus faber custom installation model, the PW-662, but it also mimics the combined baffles for tweeter and midrange on some of the company's highest speakers, such as the Aida, Lilium and recent La Cremonese, though those use the company's 'Arrow Point' DAD tweeter.

The two drivers here are lower in level but still both designed in-house. Silk domes are considered a hallmark of Sonus faber's 'Natural Sound', the 28mm tweeter here backed by a ferrite magnet system with copper cap on the pole. When the removable grilles are off you can see the dedicated waveguide in front of the tweeter, which aims for a broad dispersion pattern.

The mid/woofers are 133mm long-excursion paper-pulp cones, here with neodymium magnet systems with copper caps and aluminium rings, housed within Sonus faber's new 'Organic' basket, designed to avoid symmetrical patterns and allow a non-disruptive air flow around the driver.

These are active speakers, of course, so there are amplifiers internally, four in total: one for each driver, all mounted within the crossover section. Each tweeter has a 100W (no envelope stated) Class-AB amplifier, and each mid-woofer a 250W Class-D amplifier. To dissipate heat there's a large ribbed heatsink that surrounds the port and dominates the rears of the speakers, so much so on the Master that you don't initially see where the connections could all be. The answer is that they're pretty much underneath.

The Duettos do have custom-designed stands; we didn't have these for review but they should make the most of the speakers in terms of firm support as well as allowing neat cable management from this position below.

We should note that while Sonus faber's higher-end models are fully made in Italy, the Duettos are one of their more mass-market

Tucked below the rear of the master speaker is the connections bay with Ethernet (and Wi-Fi), HDMI ARC, optical, and a phono/line-level analogue input, plus Sub Out and USB-A.

products and proclaim themselves to be 'Designed in Italy; made in China'.

Control and inputs

The two speakers here are not the same: one is a Master, the other a 'Satellite' (such pairs used to be Master and Slave, but it would be a foolish company indeed which retained that nomenclature today).

The Master has all the inputs to the rear/base, while its leather top panel is sliced through with control strips and buttons, which are collectively called the 'Senso' system, inherited from the Omnia, the company's award-winning one-box wireless speaker. We had not initially realised the very close connection between the Omnia and these Duettos — same remote control, the same Senso controlling much of the streaming system. And that's no bad thing, clearly, since we ourselves awarded the Omnia for its abilities and performance.

Still, we have found that the Senso system can be a little less than instantly intuitive in use. The small front strip is touch-sensitive and changes colour to indicate the input. It can be used with the buttons either side to control volume, input selection, play/pause and other functions.

The longer vertical strips are just LED Feedback Strips, more pretty than useful in our view, although during set-up the central strip animates to show a successful network connection, and flashes to show pairing between speakers. A leftward ripple indicates an update in progress (software updates should happen automatically, around 2am GMT apparently, so they might interrupt your lunchtime listening here); there is rightward rippling during a reset. The main strips go dark when the Duettos are muted and the small front strip flashes in white.

The trouble with colour being the indicator for input is the lack of other feedback on what is selected. Taking a quick tour of the inputs round the back, there's HDMI (strip lights up orange), optical digital in (magenta) and a single analogue RCA pair (pink) which can play from a line input or, at the flick of a selector switch, a turntable equipped with moving-magnet turntable.

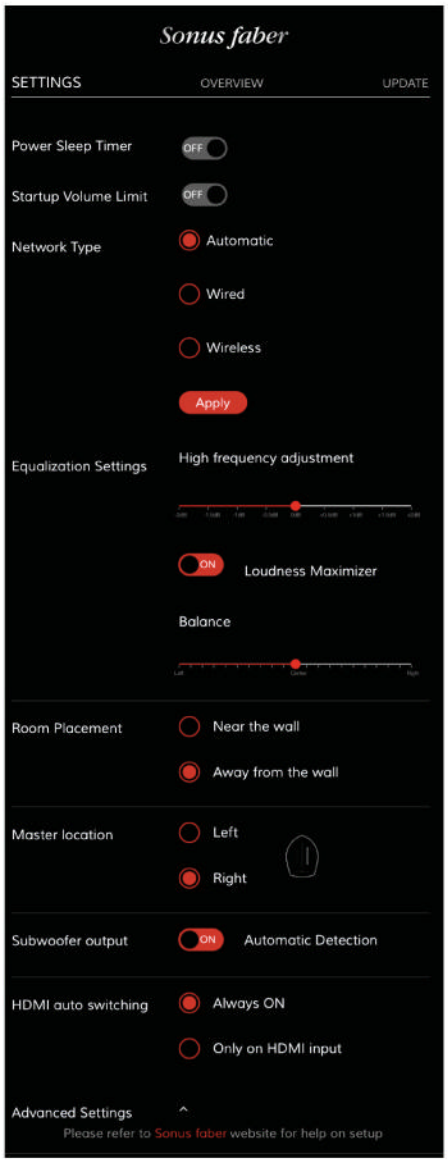
Then there's streaming. The control strip goes blue for (you guessed it) Bluetooth, white for streaming and specifically AirPlay, yellow for Chromecast, green for Spotify Connect, light blue for Tidal (also in direct Connect form), and finally purple when fed by Roon (optional, pricey, but great).

Not quite finally purple, actually, because there's a whole section in the manual entitled 'I have a red control bar'. This is a colour you don't want to see, since it indicates a warning or error, and the manual section is there to help you work out what's wrong.

Do you need to learn all these colours? We were going to say yes, or at least learn the ones you're going to use, because there's no other display to tell you what input is selected, nor does the remote control offer direct input selection. There's handy browser access to some controls, but not input selection. We have a feeling the inputs might be intended to auto trigger (to thereby avoid selection altogether), but if that was the plan, it didn't happen much.

Voice control? Siri could control AirPlay playback from an iOS device, and Google for Chromecast. But there's no voice control of the Duettos that allows input selection.

So if you want the HDMI input, you have to push the remote's input button repeatedly until you see the top strip going orange, a tedious process, and from low seating like a sofa you may not be able to see the speaker's top light changing colour, so you'll have to stand up as well.



This is not an app, rather browser-based access to the Duettos' settings. An app should follow which adds input selection to the control here of EQ and settings not available on the remote.

However, help should be on the way. This will, we gather, be solved by an app which Sonus faber shows on its website, but which isn't yet ready for us, perhaps because of our privilege of an early pair to review. From what's on the website, this app includes clear input selection, which will be very helpful.

Also round the back is a line-level subwoofer output, an Ethernet socket for networking in preference to the Duetto's inclusion of either 2.4GHz or 5GHz Wi-Fi, and a few press-stud buttons which can be used to switch Master-Satellite left/right positions, and to pair the speakers.

Ultra WideBand arrives

So we've already seen two types of wireless connection here — firstly Bluetooth for music streaming (which supports SBC, AAC, aptX and aptX HD codecs), and secondly Wi-Fi,

which links to your home network and thereby to the internet, allowing various types of music streaming to take place.

A third type of wireless connection takes care of communications between the Master and Satellite Duettos, and it is Ultra WideBand, a potentially game-changing wireless technology which we are seeing in a consumer hi-fi context for the first time here.

This will be interesting if you happen to live in Indonesia, Russia, Ukraine or one of various Turkic countries which don't allow any use of UWB, and require it to be turned off even for location finding in a smartphone.

The rest of us can enjoy the first UWB implementation for consumer hi-fi to have reached us. The chipset used here comes from Canada's Spark Microsystems, and the breadth of transmission allows UWB to use low-level but carefully-timed frames of information, delivered with absolute minimal latency. That need for careful timing synchronisation is currently a key development area for UWB in audio.

One day we may see UWB taking on Bluetooth to deliver genuine high-res wireless headphones; Spark's chipset can supposedly handle uncompressed 24-bit/96kHz. For the Duettos, Spark is simply used to establish a strong, fast and robust wireless link between the two speakers — robust because UWB should not be affected by heavier Wi-Fi traffic, Bluetooth bursts, or anything else. UWB data passes freely through all such spectra.

Since it's our first time with UWB, we were interested to note the warnings: "*The passage of people or the presence of water between the Duetto units could compromise their wireless transmission.*" Take care positioning that aquarium, then! We did know that bodies can block UWB, as it's a key issue being overcome for potential UWB headphone use.

Setting up

We'd seen the pictures, but until we unboxed the Duettos we hadn't clocked the extreme tapering to their rear; that lute cross-section forms a Gothic arch to the back with a specific point to its apex. That makes the back of the speakers most unusual, with the heatsink curving away from the spine.

It's weird to find no speaker terminals to the rear, but of course this is an active speaker. Yet you can't see any other connections either — they're all secreted away in quite a large hollow section actually underneath at the rear.

On the satellite speaker this space has just a downfacing mains socket and a pairing button. On the master this space also hosts all the other connectors, and the space available is only just large enough, especially if you have a thick HDMI cable snaking in there. But the slot gap to the rear assists cable management, and of course if you have the dedicated stands, those cables can pass down to the floor that way. As for positioning, Sonus faber recommends a classic fully toed-in triangle of minimum two metres, with at least 50cm of clearance on all sides, including the rear wall.

Having said that, there is a setting available via the Duettos' browser-based setting page (and maybe app-to-come) where you can select a "near the wall" option, which tames the bass a tad to adjust for such reflective support. Sonus faber says there should always, however, be at least 10cm behind them.

By default the Master unit is configured to be the right-side speaker, which was convenient for us, but it's easy to switch them around using the button on the back of the Master. Another button pairs them, making that UWB connection — and we did need to pair them; they didn't arrive pre-paired. The Master unit's central LED strip flashes (rather briefly) when the pairing is complete.

With active speakers comes power, but with power comes heat. The Duettos' rear panels wrap huge heatsinks around the rear ports.

'Senso' control: the 'lute-shaped' leather top panel of the Master speaker is slit through with three large indicator strips plus the colour-changing touch strip and dots near the front.

You can get them connected to your home network in any of several ways. An Ethernet cable is easiest, fastest and most reliable. But if you're using an Apple phone or tablet, you can set them up on Wi-Fi as an AirPlay speaker, or use the Home app to add them to your home. If you're more Android, you can use Google Home to add them and make them available for Chromecast. Both 2.4GHz and 5GHz Wi-Fi bands are supported.

We set them up as an AirPlay speaker; the phone initially told us this process had failed, but it hadn't — the speakers were clearly now online and receiving streams from our phone.

We also connected their HDMI socket to our 75-inch television's ARC-equipped input and then positioned them flanking the screen. This HDMI input makes the Duettos ideal as a TV and movie sound system, as well as for music. If your TV doesn't support ARC, then move to the optical digital connection instead, or analogue as your last resort.

We were pleased to see a QR code in the manual to access the web-based settings page — pleased because the previous Sonus faber smart product, the Omnia all-in-one, had a 'secret' unmentioned web-based set-up page which we stumbled upon and found some EQ functions that could be accessed nowhere else. It's the same here, but this time better advertised! In addition to setting up the Wi-Fi connection etc., this web page again has more detailed equalisation settings — there's a high frequency slider adjusting HF gain from -2dB to +2dB, and a Loudness Maximizer which boosts the bass at low volume levels. There's no way to toggle this on and off via the remote control or the unit's own controls — and, critically, the Loudness is 'on' by default. This web page (and presumably the forthcoming app) is the only place you can change that.

"For some of the stuff here, wireless means something entirely new for consumer hi-fi products. Between the two speakers the Duettos use Ultra WideBand transmission..."

You can also do that "near the wall" room placement if need be, and adjust balance between left and right, and — if using a subwoofer — adjust more complex subwoofer controls over cut-off, gain and delay.

With all our options selected, we left the Duettos on general music and TV duties for a week, before returning to have a critical listen.

Listening sessions

All this new technology — the amps and the streaming and the touch controls — it wouldn't matter how good and clever they are if the loudspeaker design on the end of it all were to turn out a dog. That would be quite the surprise from Sonus faber, of course, and thankfully no, the Duettos are well up to the quality we'd expect from the company.

Nor did we have to wait a week for them to come on song; only a couple of hours into our listening we were thrilling to the newly remixed and expanded Dylan Budokan concert from 1978, far improved over our grungy vinyl original: the newly-included track *I Threw it All Away* sounded contemporary and powerful through the Duettos, Dylan's vocal clear, crisp and emotive in the centre, backing singers and then saxophone off in the right channel, and plenty of depth and power to support the rest of the band. Two entire new Dylan concerts to listen to! (As if we needed more.)

Peter Gabriel's *And Still (Dark-Side Mix)* is a delicate piece with space and cellos, punctuated by a beautiful central violin motif. Through the Duettos there was no missing the slightest emphasis in Gabriel's vocals, while we could expand the sense of space by adding volume pretty much as far as we might possibly wish, finding no obvious performance limit requiring us to stop.

This ability to play loud without cracking up proved a boon as our listening days extended. We later moved them up to a smaller space, positioned in almost the minimum recommended two-metre triangle, and wow they gained some energy up there. Tidal Connect served us a 2022 remaster of Take 13 for The Who's *Won't Get Fooled Again*, and after some studio chat the Duettos slammed out the song's arrival in an absolute mirror smash of a soundfield, and didn't let up thereafter, Entwhistle's bass especially solid and nimble in the middle, no overdubbed Daltrey scream but a rogue Moon bash in the re-entry. This was a suitably huge presentation for a huge song, delivering musical moment after moment, including an almost comical runaway *Baba O Riley-style* race to the end.

Another live track with which the Duettos went wild was the remastered live *Dazed and Confused* from Zeppelin's 'The Song Remains The Same'. Digital Zep is rarely as good as vinyl Zep, but this was something else, a massive and heavy presentation with the kick drum thumping so powerfully we had to reach out and touch our nearby subwoofer just to check it hadn't somehow miraculously entered the signal chain, such was the solidity and depth of the sound. It was extraordinary performance from speakers which are, after all, relatively slim and room-friendly.

The reason we had moved the Duettos into a different room was an extended problem in the original room where we had a Samsung TV plugged into them first via HDMI ARC, and then via optical. Either path proved unstable, not dramatically so but with just-audible glitches once every couple of seconds and a clearly audible drop-out every 10 seconds or so. There were other glitches — sometimes a Tidal Connect stream would be initially skewed over to the left speaker, the Master quieter than the Satellite, a balance error which would correct itself to deliver a proper centre after a few minutes; really weird.

Further, things just sounded so much better upstairs that we wondered if those glitches were just the audible bits of a significant data-related quality drop. It's very hard to

tell what's going on when a wireless link fails, and even harder if you suspect it of merely underperforming. Our glitching issue was duplicated on optical and HDMI inputs, with the skewing thing on Tidal too, so initially we were all for blaming the radical Ultra WideBand transmission system, and all the more so when we found the UWB signal to be blocked completely when we left our own passive standmounts between the Duettos.

We know that one of our test positions can suffer from a troubled Wi-Fi environment; we've had other wireless speakers struggle in the same location, though we've never worked out exactly why. But one key point of UWB is that it's supposed to be immune to busy environments. It should get through anything — except water, bodies and, apparently, unused loudspeakers.

Up in the music room we were using the same cable, same scenario but the Hisense A8KAU TV elsewhere in this issue (and later a TCL Roku TV), and we never heard a glitch again. Things also sounded significantly better. So from that analysis, we might blame the original TV for some compatibility issue, though not explaining the Tidal glitches.

There was one very pleasing discovery during this move upstairs — how easy it was to switch the master speaker from being the right to the left. There is a press button on the back to achieve this (and you could check by sweeping the web/app balance control left and right). Then we noticed a simple toggle control in the browser window to do this.

Not only easy to switch, then, but easy also to experiment any time with left-right reversal. All sorts of recordings get reversed before release, or between releases — Led Zeppelin's 'Mothership' compilation for one. Should you know or notice, this software control is far easier than flipping cables; besides, hey, what cables would you flip on a streaming speaker?

How about that Loudness Maximizer? We found this a difficult call; its effect is not dramatic, and it's supposed to operate primarily to raise bass when playing quietly, which is a good thing. But it can also add a small amount of flab even when listening up at reasonable levels. We were not pounding but certainly turning up *Superstition* by Stevie Wonder on Tidal Connect, and the bass was sounding a little over-rounded — we went to that web page, turned off the Bass Maximizer and the bass was instantly entirely natural, without that tiny sense of being forced. Same with *Born To Run*, same with *Heart of Glass*, same with lots of tracks. It's also useful to turn it off when listening to True Crime TV where the soundtracks have constant low-frequency beds and pulses to ramp up the fear factor. Turning off the Maximizer dropped their insistence levels.

So we repeat what we said when the company's Omnia did the same thing. Hiding EQ options somewhere semi-secret is absolutely ridiculous, especially something like a bass boost. Many users won't know their speakers can sound better, or at least more natural. It should be on the remote control. At least the browser access is now in the manual, while hopefully the promised app will make the EQ options more obvious and accessible.

Another thing that might go on the remote would be individual input selection. When we moved on to plugging in a turntable, we were delayed by having to go back to the manual to see what colour input we needed to choose for the analogue line/phono input — pink, that's

right. But then, is that current light magenta or pink? Hard to tell. Again the app's input selection will make this far easier.

In addition, attaching anything to the Duettos requires up-ending them entirely to get at the connections bay, and it might be all too easy to finger a tweeter or driver when holding the speakers upsidedown. We found the connections to be best made by flipping the Master completely onto its leather top (put down a cloth first). It's still not easy getting in a thick HDMI cable and potentially three analogue leads (fixing the turntable earth pin is particularly fiddly), and we twice reset the speaker accidentally while reaching by 'feel' for the phono/line selector — the reset button is right next to it, and requires only a momentary touch to activate. And the reset then requires re-pairing the two speakers, with another button press under each speaker.

Still, this was all instantly successful, so finally we could hear the playback of Dylan's 'Highway 61 Revisited', a 45rpm Mobile Fidelity pressing (pre-DSD era, we think, but sounding none the worse for it either way). Side three rollicked along, the Duettos gifting a hugely full delivery to Harvey Brook's pounding bass guitar on the title track, and with all the whistles and slide guitar punctuating the mix we've never enjoyed it more.

That's not an album to judge soundstaging, however, because it's mono. So we loaded the 2020 2-LP issue of 'Koyaanisqatsi' (no. 892 of 1500 numbered copies), to see what the Duettos would make of the mournful Glass organ opening track, especially once the biggest organ pipes had been pulled out at the end of the first track.

Quite a lot, is the answer — again the Duettos were able to deliver a resonance beyond expectation for their size (Loudness Maximizer off). The rest of the LP showed their ability to deliver soundstage width — a ping-pong mix for pulses from the brass while the percussion, horns and strings get a traditional orchestral spread with clear depth to the back, and such edgy delivery of high-frequency organ stabs on *Organic* that we marvelled at the frequency range of this clean piece of vinyl through this capable system.

So the Duettos and a good turntable are all you need to make such a capable and thrilling vinyl system. How fortuitous that this issue of *Sound+Image* is full of good turntables!

While we thought its bass performance remarkable, if it's not quite getting to the bottom of your latest CloZee Future Bass collection, you could always run an active subwoofer from the master's RCA socket. We tried this when using the Duettos in one of our TV systems, where we spent several weeks listening to all TV and movies through the Duettos. They are a stunning pair of active speakers for this purpose. And they really don't need a subwoofer. While the sub and Duettos did prove an impressive combination when rumbling away the SFX in AppleTV+'s *Foundation*, say, keeping the subwoofer permanently in circuit made network news stings rather too exciting in their bursts of energy, and ramped the intensity of tension in *The Curse Of Oak Island* to anxiety-inducing levels.

We preferred the Duettos playing alone. Their balance for TV was great for either daytime speech or night-time drama; the bass level of the Duettos suits movie soundtracks perfectly, and of course they are ready and waiting with delicious music whenever you remember to turn the TV off.

Talking of which, the Duettos do encourage you to turn the TV off, and not

only to hear their music. When you have a TV connected via HDMI, turning off the TV will automatically turn off the Duettos at the same time (via CEC, HDMI's built-in control system), just as turning on the TV will also turn on the Duettos and (usually) pre-select the HDMI input.

One scenario glitch, however — if you walk away or leave the TV silent, the Duettos power down on their own after not very long. Do not then power the Duettos back up! For some reason they then don't know where they are. Instead turn off the TV, pause a moment then power it back up again, thereby waking the Duettos up together again. This may happen all the time to those who attach the Duettos via HDMI to a desktop computer monitor, where audio will not be constant. To fix this, it might be good to add an option to defeat the Duetto's timed auto-standby, perhaps via some later firmware update.

Other than that, the only issue we experienced was that early glitching in the first room, which might have been a TV issue, even though weird balance issues were occurring on Tidal streams too. Yet in the second half of our testing, the glitching did not reoccur. We mention it mainly in case it's common during set-up, and other users may be reassured that we experienced this only temporarily. Was the UWB finding its path and settling in? Doesn't seem likely; we asked our contacts at Spark Microsystems in Canada, providers of the UWB technology here, for their opinion.

"the Duettos gifted a huge delivery to Harvey Brook's pounding bass guitar, and with all the whistles and slide guitar punctuating the mix we've never enjoyed it more..."

"UWB operates in the 3-9GHz spectrum," they replied. "Because of physics, signals in this range of frequencies are prone to blocks. Non-line-of-sight performance will vary depending on location and conditions. Water and body (which is mostly water!) are good examples of strong blocks."

However, they also pointed out that the many reflections in a room typically help with body blocks, enabling the signal to reach the receiver from various angles.

Hence UWB should work well as a short-range communication channel with excellent bandwidth and very low latency, says Spark. "These are enablers to the Sonus Faber product because they allow transmission of high-quality uncompressed audio, eliminating latencies."

It's worth noting that Spark doesn't recommend USB through walls: "While the signal will travel through simple sheetrock walls, we do not recommend extending the channel to multiple rooms," they told us, also noting that regulatory requirements limit transmit power, and this limits range.

So while we had a perfect experience in one room, the issues elsewhere with blocking mean that to our minds, the merits of the UWB link were not entirely proven here.

It succeeded in one important way, however — latency, or lack of it. Wireless speakers that are not connected by a cable often cause a small delay through transmission, which can show up as sync issues when watching video. Not only did we have no sync issues with the Duettos, we didn't even think about this issue, which is very rare. UWB's very low latency might be doing some of the heavy lifting there.

We were a little divided on the remote control. It's easy to mislay, being small and entirely black. You have to point it quite tightly at the bottom of the speaker, and the buttons are a bit spongy to use: you must firmly press the centre of each button where the actual stem sits. And as noted, we'd gladly accept a larger size of remote with room for dedicated buttons to select at least the three physical inputs and the EQ options.

Yet the missus announced this was her favourite remote control in the whole house, because the buttons are so flat and it's easy to wipe clean — a worthy point in these days of viral particles. So let's call that evens. We'll pass over how she characterised the diagonal speaker baffles, for which the Duettos come with removable fabric grilles, also diamond-shaped. We prefer their look grilles off.

Conclusion

The Duetto speakers sound fantastic, and they nail the active speaker brief in a highly consumer-friendly way — so simple that the Duettos will appeal to similar buyers as the all-in-one Omnia as the simplest of hi-fi systems, here two boxes instead of one, and delivering ease of use (once the app arrives with input selection and EQ) wedded to a quality of sound that is not only real hi-fi but also real value — yes, even up at nearly $7k, considering you get the amps and streaming all included with the speakers.

What your money gets you is a real hi-fi system capable of a powerful entertainment combination, in a scenario kept simple to connect and operate. In fact you might say that these Duetto speakers achieve the sound of Sonus faber, but now wireless.

SPECS

Sonus faber Duettos $6995

Type: 2-way vented box

Inputs: RCA line/phono in, optical digital, HDMI eARC/ARC, Ethernet, Wi-Fi, AirPlay 2, Chromecast, Spotify Connect, Tidal Connect, Roon, Bluetooth (SBC, AAC, aptX HD)

Outputs: subwoofer

Drivers: 28mm silk-dome tweeter, 133mm long-excursion woofer

Crossover: 1900Hz

Quoted frequency response: 37Hz–30kHz

Amplifiers: 2 x 100W Class-AB, 2 x 250W Class D (no envelopes stated)

Dimensions (whd): 340 x 210 x 280mm (108cm high on dedicated stands)

Weight: 6.8kg (master); 6.45kg (satellite)

Contact: Synergy Audio Visual

Telephone: 03 9459 7474

Web: www.synergyaudio.com

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Stylish power with a Blu bonus

Roksan Attessa
streaming amplifier

UK marque Roksan delivers a stylish exterior for a solid Class-AB amplifier enhanced by full BluOS streaming.

SUMMARY

Roksan Attessa
Streaming Amplifier
Price: $3499

+ Rich, powerful sound
+ BluOS streaming
+ Remote and app control

– Minijack headphone

Roksan is a UK brand which goes back to 1985, when its graduate founders launched the Xerxes turntable at a UK hi-fi show, its novel groove-tracking design wowing punters and critics, and beginning a long line of successful turntables and tonearms.

So it's a bit rude, perhaps, in this issue packed with vinyl joys, that we're not looking at a Roksan turntable, but instead the Attessa Streaming Amplifier, an example of the electronics into which the company later diversified during an evolution which included acquisition in November 2016 by British loudspeaker manufacturer Monitor Audio (itself recently enjoying the 50th anniversary of its founding by legendary hi-fi impresario Mo Iqbal).

One of the original Rokson founders, Touraj Moghaddam, is now applying his vinyl arts at Vertere. The other founder, Tufan Hashemi, remains Managing Director at Roksan Audio, where they continue to name products after characters from Persian history and legend: Roksan itself after Roxana, daughter of Persian King Darius the Great, and the Attessa presumably after Atossa, eldest daughter to Cyrus the Great, and wife to Darius.

Build & facilities

This Attessa is the company's first streaming amplifier, meaning an integrated amp including a digital section for networking and streaming. It's able to be operated using an app called MaestroUnite, which allows smart-device control of Attessa features — input configuration, headphone socket output voltage, analogue input gain, channel balance, and low-power standby mode. The app also simplifies implementation of any firmware updates that become available. With the app you can also link to other Roksan components, such as its companion Attessa CD transport ($1099).

There's also an Attessa turntable available, which just busts the upper limit of our vinyl round-up this issue at $2199, but which completes a separates hi-fi system under the Attessa sub-brand bar the speakers. And if you're not interested in streaming, you can save yourself a full grand by getting the $2499 non-streaming Attessa integrated amp, which is otherwise identical to the one reviewed here.

The amplifier is said to be a completely 'in-house' design, yet the Attessa is, as you can see, a great-looking component, with an ultra-modern design aesthetic. Roksan has long been renowned for its designs, most created by industrial designer John Cornock, also behind the look of the Radius turntable, the DP1 CD transport and the range of ROK amplifiers. Here this Attessa amplifier has its otherwise rectangular chassis cut away at a 45-degree angle on both sides at the bottom, while the single rotary control at the centre of the front panel visually resembles the body of a bird with slim black 'wings' extending to either side.

After the Attessa is powered up, the 'wing' on the right side of the rotary control becomes sliced with up to 20 vertically-orientated orange-coloured OLEDs that give an indication of the current volume level, while on the left side the 'wing' has icons that illuminate to indicate input source selection, Bluetooth status and BluOS status.

Yes, BluOS! Roksan is one of the few companies beyond the Lenbrook Group (NAD, PSB Speakers and Bluesound) which has taken up the BluOS operating system (Dali, Cyrus and Peachtree are the others). As a result you here gain full Bluesound abilities, including multiroom sharing with any other BluOS or Bluesound products. BluOS is a music management system that allows you to access and stream lossless music up to 24-bit/192kHz via your home network. It is compatible with MacOS,

Windows, Android and iOS, and it integrates with most streaming services — Qobuz, Deezer Amazon HD as well as various free services and internet radio. It also supports Spotify Connect and Tidal Connect, with playback controlled directly from those services' own apps. There's also support for Apple AirPlay 2.

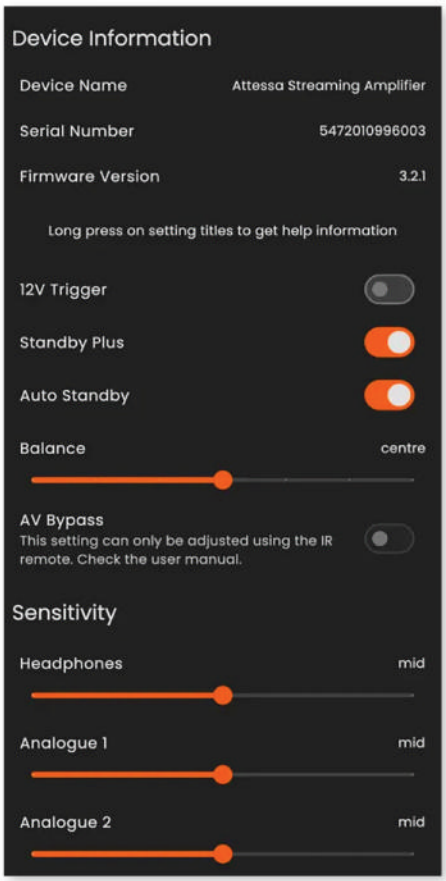
The BluOS also explains why streaming adds a grand to the price of this amplifier, because that's pretty much the entry price for anything gaining a BluOS module. Bluesound offers two different pre-built modules to licensees: the one used in the Attessa is the NPM-2i, which has a 1GHz ARM Cortex A9 processor, and requires an external USB 'dongle' to connect via Wi-Fi. This dongle is supplied as a standard accessory with the Attessa, though for reliability you might plug in an Ethernet cable if you're able.

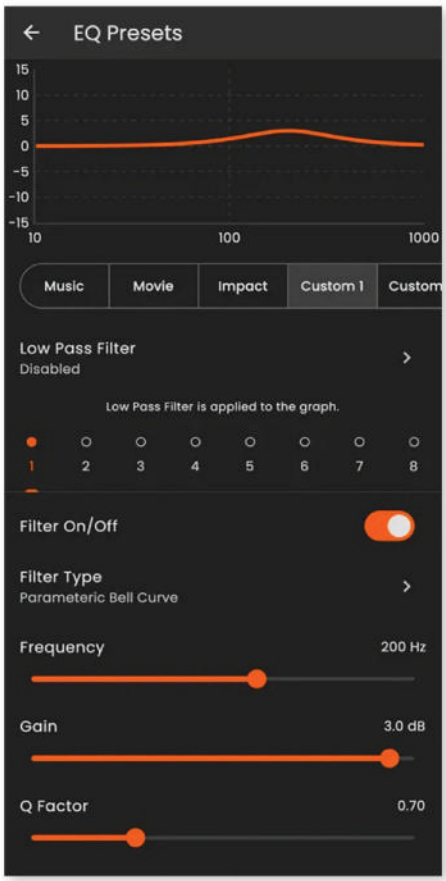
The BluOS OLED icon is a veritable 'Christmas Tree' of status indicators, the various colours of which indicate 'Hotspot' mode, attempting to connect, ready to stream, receiving infrared signals from the remote (about which more later), muting, indexing the local music library, replicating an updated Index from another BluOS device, waiting to perform an upgrade, or that it has timed out after 15 minutes in 'Hotspot' mode. There's a different colour for each of these status alerts; good luck! (One of the available colours is red, but everyone knows that with Roksan, you don't have to put on the red light.)

To the far left of the 'wing' is a group of three physical buttons that can be used for play/standby or next/previous track access in the event that it's easier to do this via the front panel than via the infrared remote or your smart device, plus at the extreme left a physical power standby button. The Attessa has both a 'standard' standby mode and a 'Standby Plus' mode. The latter enables the MaestroUnite app to turn the Attessa on from standby and share its status while in standby, as well as allow auto-signal sensing switch-on for the A2 input. It also enables the Attessa to be BluOS visible on the network and able to wake from standby by BluOS.

The only penalty for all of this flexibility is that the 'Standby Plus' mode consumes a bit more power than the regular one. You can toggle between the two standby modes by pressing the play/pause button on the remote or via the MaestroUnite app. Or you can switch the 'Auto Standby' feature off, which will force the Attessa to remain powered up permanently.

At the far right of the right-most 'wing' is a 3.5mm headphone socket. We prefer a full-sized 6.35mm headphone socket (minijacks were a compromise necessary for portable devices), but no doubt Cornock had his reasons, and the output voltage of this socket is usefully variable between 'Low', 'Mid' and 'High' to help compensate for the different efficiencies of differently designed earphones and headphones.





"One of the available colours is red, but everyone knows that with Roksan, you don't have to put on the red light."

The central rotary control's main function is to control volume, including instantly muting the output with a quick press. With a longer press it can be used to select the signal source, rotating clockwise or anticlockwise. There are no 'indents' as such to indicate when a specific source is selected; instead you get what Roksan calls 'haptic feedback': a type of vibration. It's very high-tech! Of course, you can also select input source via the remote that is supplied (not an optional extra, as with some manufacturers) or via the app.

There are three analogue inputs and the amp defaults to the first, A1, whenever the unit is powered up from 'off', but from standby it will default to whatever input you were using prior. There are two line-level analogue inputs (A1, A2), one phono-level input, four digital inputs (two optical to 24-bit/96kHz, two coaxial to 24-bit/192kHz) plus two USB-A slots, the first for use with the aforementioned Wi-Fi dongle, while the other can be used to connect a USB stick or drive with music files, which the BluOS app will index. There's also Bluetooth.

So it's not particularly laden with inputs, though with a better selection than on some other BluOS amps. Notably here there's no HDMI ARC socket to make this nicely TV-compatible, nor a USB-B connection for a computer (remembering, though, that BluOS has apps available to play from computer).

The A2 input can be reconfigured as an AV input that bypasses the volume control should you wish to use the Attessa in a multi-channel system. If you set A2 for this mode, the three vertical OLED bars closest to the headphone socket in the volume level display will illuminate whenever A2 is selected, to remind you this socket is at full level!

The sensitivity of the three analogue inputs can be adjusted between 'Low', 'Mid', and 'High'; the phono stage also has three sensitivity adjustments, all for moving-magnet cartridges, and the load is set for this cartridge type (47kΩ/56pF).

The fourth RCA terminal pair is a preamplifier output, should you wish to use a more powerful power amplifier in conjunction with the Attessa. If you don't use the pre-outs for this purpose, you could use them to connect a powered subwoofer.

Roksan's app (shown) accesses amplifier functions, while the BluOS app can be used for indexing music and online streaming.

Below the analogue inputs you can see that although the Attessa was designed and engineered in the UK, it is built in China.

The speaker terminals are not only very closely spaced, but three of them are also very close to the edge of the chassis cover, which protrudes over the rear panel. This all makes it a bit difficult to connect speaker wires, and our recommendation would be to remove the small plastic inserts in the centre of these terminals and use banana plugs, rather than bare wires, spades or pins.

We had a peer inside: the Attessa uses a conventional Class-AB output stage, with two pairs of output transistors per channel. Rather unusually, these transistors are not identified in any way, either on the devices themselves or on the PCB, so you'd have no way of knowing what to replace them with in the event they failed, though their fuses should protect them in the first instance.

The Attessa also has in-built protection against over-temperature events, which Roksan says can occur "*where the amp has got too hot due to being played for long periods of time and/or at high levels. Additionally, this can also happen if something has covered it to stop the air escaping from the unit.*"

If the amplifier does overheat, the amplifier will mute for 15 minutes, after which you will have to press the standby button to reset the circuit. There's also protection in the event that your mains voltage is too high (above 240V) or too low (below 210V).

Listening sessions

In the event you didn't know that Roksan was owned by Monitor Audio, you would find out as soon as you download the MaestroUnite app, as it carries Monitor Audio branding. This excellent app (screen-grabs previous page) partners with Roksan's other components, connects to your Wi-Fi network, and allows you to integrate the Attessa amplifier with the CD transport so that they appear to operate as a single unit.

It also allows you to configure the multiplicity of features that are made accessible, such as channel balance, switching out the provided icons for different ones, and checking for firmware updates.

If you're old-school and primarily playing from your own CD player or the Attessa transport, the infrared remote makes more sense, and it's good that there is one. Some of NAD's BluOS amps leave you to buy a BluOS remote separately or recycle an old one by using their remote 'learning' ability.

Listening sessions proved the Roksan Attessa to be a powerful, quiet amplifier with an extremely neutral sound and an obviously extended frequency response, particularly in the low frequencies. It was also capable of extracting the best performance from the various different loudspeakers we tried, from large four-driver three-way floorstanders through a pair of three-driver three-way standmounts, all the way to a pair of two-driver two-way bookshelves.

When used with large floorstanders, the Roksan Attessa delivered all the heft and power we could want, while at the same time exerting total control over the speakers, so that the bass was not only loud but also taut. It was also tonally precise, so there was never any doubt about the instrument producing the sound, or the pitch of the note being produced. Listening to 'Donny Hathaway (Live)', which features the insanely great bass playing of Willie Weeks, was an absolute joy with the Attessa. Despite being recorded live (some tracks at The Troubadour in Hollywood and some at The Bitter End in Greenwich Village), the sound of Weeks' 1962 Fender Precision is captured to perfection and was delivered at this same level by the Roksan Attessa. Weeks' solo on *Voices Inside* is so well constructed that it's often held up as one of the most perfect examples of its type. (George Harrison once dismissed the possibility of a Beatles reunion by saying he would "rather have Willie Weeks on bass than Paul McCartney".)

There's also plenty of amp-testing and speaker-testing bass on Foo Fighters' 'But Here We Are', as well as Grohl's frenetic — but precise — drumming, especially on *Rescue*. Even though there's still that wall of guitars, the many music shape-shifts (the echo on the opening to *Hearing Voices* being one example) point to a more nuanced musical direction for the sadly post-Hawkins FF.

There's more great bass on Ellie Goulding's album 'Higher Than Heaven', but we used it to test the Attessa's midrange and highs, plus its dynamic capabilities. The Attessa delivered her breathy, slightly nasal voice to perfection, along with the backing vocals. The cymbal taps in *Cure For Love* were crisp, with ride but no overhang. Fantastic. The swirling synth sounds were completely enveloping, as they should be. And then there's the total lack of background noise. This is one very quiet amplifier.

We moved to vinyl sessions, the Attessa's moving-magnet phono stage proving very nice indeed. It's quiet, has a good overload margin, and its frequency response is as linear as that of the line-level inputs, which we established by A/B-ing the vinyl of Billy Joel's album 'The Stranger' against the CD version. Playing vinyl, the bass on *Movin' Out (Anthony's Song)* was powerful and extended. The cymbals hissed crisply, and when they were cut-off, the cut-off was sharp — no overhang at all. The piano sound on the introduction to the title track was authentic and the whistling that follows was rendered just right too, without any sibilant edges. The piano chords on the intro to *She's Always A Woman* were tonally accurate, and then when they're arpeggiated later in the track, the balance between the individual notes was nothing short of exact.

Conclusion

We were entranced by the sound, and we were impressed too by the retail price, given the combination of amplifier quality and the great facilities of BluOS. And compare the lovely design of this amplifier next to some rather more boxy BluOS amps around this price. Put that all together and the Roksan Attessa Streaming Amplifier is a potent sweet spot of real value for money here in Australia. The Attessa amplifier won itself an EISA Award last year, and we're happy to confirm our own recommendation here.

SPECS

Roksan Attessa $3499
Streaming Amplifier

Inputs: moving-magnet phono, 2 x line-level analogue, 2 x optical digital, 2 x coaxial digital, USB-A, Bluetooth (SBC, AAC, aptX), Ethernet/Wi-Fi, BluOS

Outputs: speakers out, pre-out/sub-out, minijack headphones

Power: 2 x 80W into 8 ohms, 2 x 130W into 4 ohms (both channels driven, THD+N <0.1%)

Dimensions: 432 x 76 x 373mm

Weight: 10.37kg

Contact: Interdyn Brands

Telephone: 03 9426 3600

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JOIN THE VINYL REVOLUTION!

FROM SURVIVAL TO REVIVAL

Vinyl LPs are, amazingly, the fastest-growing category in Australian music. Last year's ARIA sales figures won't come out until March, but in 2022 vinyl sales increased 23% in volume in Australia, while subscription streaming services rose only 8.9% and compact disc sales plunged more than 17%. Vinyl now brings in almost twice as much money as CDs. Hoorah.

Here at *Sound+Image* we continue to celebrate the fact that vinyl records have gone from survival to revival. It has brought the joys of vinyl replay to many new listeners, and unlike streaming, you can't do it with your phone, so that the vinyl revival has also fed a new interest from a new generation in amplifiers, speakers and hi-fi in general.

What's the attraction? We don't think it's the sound, to be honest; digital music well delivered can be clean and pure, while often being a whole lot easier to get playing. But its very convenience has randomised delivery: how often do we hear a digital album played right through? Playlists and shuffling have broken digital music into little pieces. The full presentation of an album — or a full side, at least — is one of the great attractions of a vinyl listening session: 20 minutes of music in the order programmed by the artist themself, and 12 inches of artwork to set the mood and provide all the musical details at something approaching a legible type size.

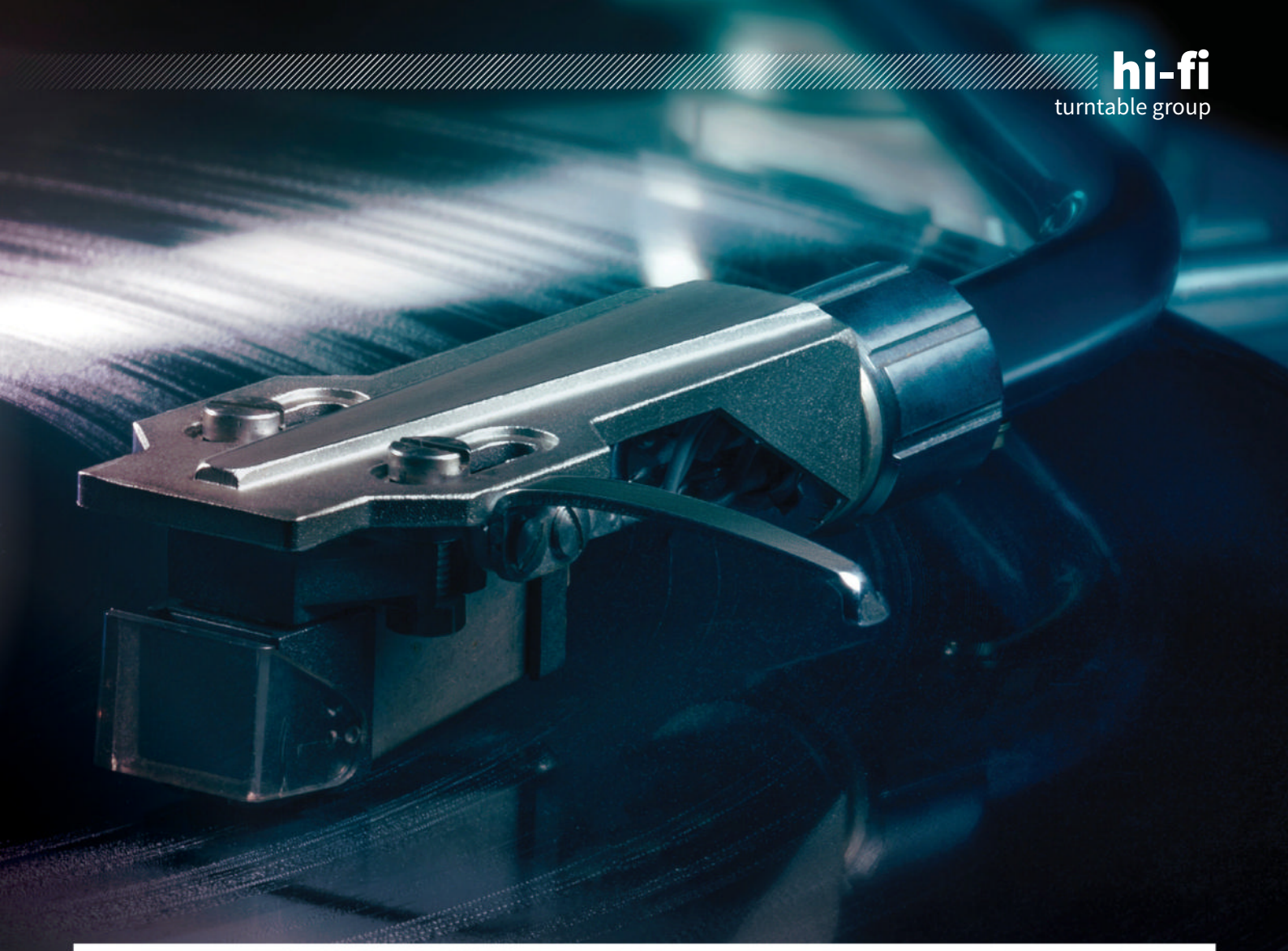
You can find bargain turntables under $100, but we'd say that's just too low. It's no coincidence that the concept of 'source-first' in hi-fi was popularised by a turntable maker. There are few limits on how high the art of turntable design can go, but equally if you spend too little, the problems accumulate. There's no other component in hi-fi where spending a little more can reap rewards, and where underspending can cause your sound quality to crash.

That argument makes our first couple of turntables from this round-up incredibly good value for money, their performance remarkably respectable at amazingly low pricing. Then we rise up through the ranks. There are suitable turntables here whether you're starting out in vinyl for the first time, seeking a return to the joys of the black stuff, or perhaps are now ready to be tempted into an upgrade from a longheld disc-spinner which is reaching the end of its days.

One weird thing with turntables is that expensive ones have no 'extras', while less expensive ones may have more! Despite limiting our selection here to a ceiling of $2000, some of the cheaper ones come with phono stages built in, USB out to computer, even Bluetooth streaming.

But do you need that? Remember that those extras take money away from fundamental turntable performance. It's the quality of the music that allows you to relax and enjoy. Vinyl is all about giving a programmed side of music your undivided attention.

So for background music, you go ahead and stream your tunes on shuffle. But for some real soul-healing music listening, put one of these turntables in a suitable system, and play vinyl. We'll have no background music here — join the revolution, baby!



WHAT TO CONSIDER WHEN BUYING A TURNTABLE

BUDGET
Few hi-fi components offer as much value for an increase in spending as turntables. These complex mechanical systems showcase profound differences between entry-level, mid-level, and high-end options. If you're considering allocating extra funds in your audio set-up, the turntable (and the phono stage) can be efficient ways to use the cash.

PHONO STAGE
The minuscule signal generated by a cartridge necessitates dedicated phono amplification and EQ. While some amplifiers provide a dedicated phono input, others may require a standalone phono stage. Alternatively, turntables can come with built-in phono stages — look for a line-level output in the specifications. Only one here, the Rega, doesn't let you also use the phono-level output instead for a future phono stage upgrade.

AUTOMATIC OR MANUAL
In the realm of vinyl, there's a paradox: the more you spend, the less likely you are to have automatic operation. Higher-level turntables prioritise manual operation, expecting users to handle tasks like lifting the arm at the record's end. Such semi-automatic operation can be useful, but is fairly unusual, and none of the decks here go so far as auto-lifting at the end.

THE CARTRIDGE
The cartridge, which perhaps has the single biggest influence on the sound production of any turntable, should not be overlooked. Turntables at this level come with a pre-installed cartridge, but check how much replacements cost, and consider the possibility of upgrading the cartridge for a not-too-expensive upgrade. For those contemplating a move from a moving-magnet to a moving-coil cartridge, ensure your phono stage can accommodate the lower signals of the latter.

BELT DRIVE OR DIRECT DRIVE
Choosing between belt drive and direct drive used to depend on specific preferences. Direct-drive turntables have always been favoured by DJs for faster start-up and speed control. Traditionally, belt-drive options were recommended for better sonic isolation and speed stability, but modern direct-drive turntables are much improved, and some now offer compelling hi-fi performance.

DIGITAL FEATURES
In addition to built-in phono stages, some turntables can digitise their output to send via Bluetooth to a wireless speaker or headphones, or via USB-B to a computer for recording. A wired analogue connection is also recommended for optimal sound quality, but wireless streaming can certainly be fun, and USB out simplifies digital recording.

SUPPORT AND CLEANING
Adequate support is crucial for any hi-fi system, with turntables being particularly sensitive to their environment. Maintain a level surface, isolate the turntable from vibrations, and keep it clean for optimal performance. Regularly clean your vinyl records using a non-shedding cloth or brush to ensure a pristine listening experience before and after each use.

Sony PS-LX310BT

Sony's turntable offers four ways to play, including Bluetooth streaming and USB recording, at a remarkably low price.

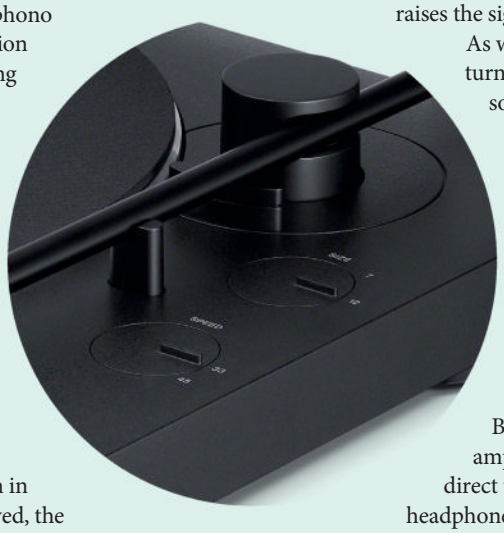
Like many other companies, Sony all but stopped selling turntables during vinyl's years of decline. But also like many other companies, it was encouraged back to the medium by its revival, both by the numbers and by vinyl's sheer cool-ness.

In 2016 it announced the quite serious PS-HX500 turntable, which received excellent reviews including a Sound+Image award. It included both its own phono stage, and a USB connection to a computer which, using supplied Sony software, could then easily digitise the vinyl played on the turntable, and at high-res, no less, in the Sony-derived DSD format if you so desired.

There was also a lower-level turntable, the PS-LX300USB, which gained less attention but still good reviews for its price. Then in 2019 the model here arrived, the PS-LX310BT, a closer relative to that lower model, yet also taking some cues from the higher-level HX500, and bringing something else — Bluetooth output.

Since 2019, Sony hasn't done anything new in vinyl. The HX500 has run out of stock in Australia, but the PS-LX310BT continues, down in price slightly to what is now a ridiculously cheap $288 for this very respectable entry-level turntable that not only delivers solid vinyl replay but a total of four ways to extract the music.

Like turntables of old, it can output direct from the cartridge at phono level, requiring a phono stage in your amplifier or as an external box. Don't have one of those? Flick the rear switch and the Sony's internal phono stage raises the signal to line level.



As with the higher Sony turntable, there is a USB-B socket which can connect to a computer for recording your vinyl (see panel). And also included is the ability to send music from the turntable via Bluetooth, making possible a wireless connection with a Bluetooth speaker, Bluetooth-equipped amp or, rather deliciously, direct to a pair of wireless headphones, so serving up vinyl for one in a private experience The Bluetooth output supports SBC and aptX, so headphones with aptX can achieve near-CD quality reception (if one dare use the term 'CD-quality' to describe vinyl via Bluetooth), while others will fall back to the less sophisticated base-level SBC codec.

SUMMARY

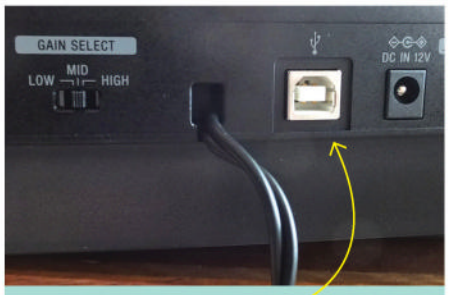
Sony PS-LX310BT
Price: $288

+ Vinyl on Bluetooth headphones
+ Good sound for the very low price
+ Four outputs for versatility
– You could spend more to get more

"Sony's deceptively simple-looking LX310 sits as a bargain re-entry to the joys of vinyl for anyone happy with a plain-looking deck that just gets the job done, in four ways."

Set up of the turntable itself was a breeze, as the arm and cartridge are preinstalled, so all that's required is to get the turntable nice and level, plug in your cables, and lower the stainless-steel platter into place. The belt is already wrapped around the underside of the platter, and this turntable uses the common entry-level method of having a red 'V' of ribbon taped around the belt, allowing you to hitch it over the pulley without your greasy fingers touching anything important.

That done you simply add the felt mat, get the twisty and foam off the arm, and attach the lid and cables. No counterweight to add, no antiskate to hang, no tracking force to apply. Under 10 minutes from unboxing to playing.



Going digital

Given you're now opting for the analogue life, it may be a surprise to find a choice of two digital outputs on a turntable at this price. Sony offers not only the headline Bluetooth streaming, but also a USB-B connection for recording your vinyl to a computer. Unlike Sony's higher HX-500 deck no software is supplied here but Audacity (a free program) is able to record the Sony's output at up to 16-bit/44.1kHz.

Of course, clever stuff is no use unless the vinyl playback is of a quality worth enjoying. The cartridge here appears a variant of the Audio-Technica AT3600L (in a non-removable headshell), and it tracked Michael Nyman's soundtrack LP to 'The Draughtsman Contract' with extraordinarily little surface noise, while the music lifted far above this, notable for its tightness, the central pulse of bass guitar and bass on *Queen of the Night* hard-edged and punchy. The strings were perhaps edgy rather than smooth, but there was depth, particularly on the last track of the side, *The Garden is Becoming a Robe Room*, where a significant wave of bass adds to the surging strings and pummelling harpsichords.

At the end of the side the arm was auto-lifted and returned to its cradle. We do enjoy automatic turntables. There are sonic arguments against the mechanisms, but on this level of turntable, the benefits for ease of use far outweigh them, especially when we turned to playing singles, where non-automatic turntables prevent you ever leaving the room for fear you'll miss the end of the 45.

We were also surprised how hard a time we had picking the phono output from the line-level output, and even the Bluetooth output when aptX was engaged. The panned acoustic guitars of *Pigs On The Wing pt2* from Pink Floyd's 'Animals' (2016 remaster on 180g) best illuminated the differences, the Bluetooth output adding slight sibilance to the vocal and edge to the guitars, while the phono output was more cleanly delivered. But the wireless experience was great fun — paired with some Sony aptX-equipped XM1000 headphones, we wandered within the Bluetooth range limit enjoying plenty of level and an enjoyable quality of sound, returning every 20 minutes or so to switch or flip over LPs.

We had one moment of confusion with this deck's automatic operation: there's no finger arm-lift with which to raise and lower the arm — this turned out to be controlled mechanically from the right-hand button on the front edge of the plinth.

How long will it be available? We don't know. Is Sony making new ones? No word yet. So for now, Sony's deceptively simple-looking LX310 sits as a bargain re-entry to the joys of vinyl for anyone happy with a plain-looking deck that just gets the job done, four ways.

SPECS

Sony PS-LX310 $288

Type: belt-drive, automatic
Platter: aluminium
Speeds: 33⅓, 45rpm
Outputs: Line-level, phono, USB, Bluetooth
Dimensions (whd): 430 x 108 x 367mm
Weight: 3.5kg

Contact: Sony Australia
Telephone: 1300 13 7669
Web: www.sony.com.au

Pro-Ject Primary E

Pro-Ject's entry-level turntable may be entirely basic, but it delivers the sonic fundamentals required to make it a fine first turntable.

SUMMARY

Pro-Ject Primary E
Price: $499

+ An enjoyable temperament
+ Nails the sonic basics
– Entirely free of frills

Pro-Ject's most affordable turntable may come with a 'Primary' moniker which implies it resides in some 'My First Turntable' category. And yes its price puts it first among the lower vinyl spinners in our group here, thanks to the Primary E being traditionally designed and entirely no-frills in terms of facilities.

Of course there are a good number of lesser turntables which you may be able to find cheaper that this or the preceding Sony — turntables in a box with speakers that you might stumble upon under special offer in an Australian Post outlet, capable of making sound with a cheap ceramic stylus. But not capable of making real music.

This Pro-Ject Primary E, on the other hand, nails the fundamentals so effectively that its performance sails to levels above such toys. It has the look of a proper hi-fi deck, too, the plinth edges and corners a little on the sharp side perhaps, but nevertheless the real deal, and fitted with a straight 22cm tonearm and a respectable Ortofon OM5S moving-magnet cartridge. The Primary E's power supply is also here usefully built into the deck, whereas this model's predecessor (the Primary-without-an-E) had a plug transformer.

And while another predecessor, the exuberant skeletal Elemental, offered a showstopping red finish option, the Primary E is available in hi-fi black (above), or a more modern décor-friendly new-age white (below).

It'll also come as no surprise to those who have even a passing knowledge of today's turntable

"Entirely basic, but on the other hand, no digital extras to confuse the vinyl novice. The Primary E is focused on delivering all the sound this level of investment can achieve."

market to discover that Pro-Ject offers variants of the Primary E. Mr Roy Hall of Music Hall turntables once joked that "Pro-Ject, who I love, have four million turntables — 17 different colours, 27 shapes…" and he should know, as some of his own turntables are also made by Pro-Ject's founder Heinz Leichnegger, who invested in Czech turntable factories at a time when vinyl was on the way out. Hence since the format came back with a vengeance, Pro-Ject has been in a unique position to deliver turntables, arms and electronics not only under its own brand but for others too — sometimes declared, like Music Hall, other times secretively rebranded.

The variants of the reviewed model here include the Primary E Phono, which is priced (or RRP, since they're often discounted) at $599, and this then adds an internal phono preamp so that no external stage is needed, whereas the plain Primary E requires a phono input on your amp or a standalone phono stage. There is also a Primary E Acryl version at $728, which replaces the normal MDF platter with one of acrylic ($239 separately).

You might also consider the more recent 'E1' up at $549 (pictured in the panel above right), also with variants, including the line-level E1 Phono ($649) and the E1 Bluetooth ($749). All come with an Ortofon OM5E cartridge and also offer a bit more in terms of finishes, being available in black, white, or walnut. So many turntables at Pro-ject!

Or you can go a bundle...

In addition to the variants of the Primary E turntable and the E1 (above), Pro-Ject's Australian distributor Interdyn Brands offers packages which also shave off a useful few dollars. One combination is called the 'Primary E Bluetooth Bundle', which adds the company's Phono Box E BT, which is both a phono stage (so it can output at line level to a hi-fi system from a minijack) and a Bluetooth transmitter which can send the music on to a Bluetooth speaker or headphones. This package saves only a dollar, so you can upgrade later.

There's also a complete system on offer, the modestly-titled 'Perfect Primary II Pack', RRP $1847 (as we write, discounted to $1499). This get you the Primary E Phono with its built-in phono stage, together with the little Stereo Box S3 BT amplifier and a pair of Speaker Box 5 speakers, and all the necessary cables to connect it up and get it singing. Just add vinyl.

Pro-Ject's range can seem overwhelming, but its breadth does mean you can always find just the right thing. A good Pro-Ject dealer will help you navigate to the right choice for you!

Performance

You won't have to spend an hour of your time setting it up, since the anti-skate weight and the 1.7g tracking force are pre-set (there's a stylus pressure gauge in the box for checking the latter), so that all you're required to do is attach the belt to one of the two motor pulleys, which provide 33⅓rpm or 45rpm — this is a deck where you reposition the belt manually to change between the two speeds.

The attached RCA cable provides output at phono level, so this no-frills version of the deck requires either a turntable 'phono' input on your amp or a separate phono stage. A cover keeps the Primary E's top dust-free.

Basic, then, yet the Primary E delivers an entertainingly musical performance once you turn on the power switch underneath the plinth. It doesn't try to walk before it can run, and it's not going to blow away decks at double or four times the price — Pro-Ject's 'millions' of tiered turntables provide a performance path to such higher things.

But the Primary E confidently nails the basics, from an even tonal balance to a delivery that's clear, clean and spacious enough to keep things coherent. There are glimpses of dynamic insight and subtlety to its presentation that will adequately deliver the basic joys of vinyl, with decent body and substance, a sense of drive and momentum, its detail more than passable in the company of suitable amplification and speakers. You may not disappear into the realism and scale of vinyl, as higher decks allow, but it doesn't squeak nasally like a budget deck-in-a-case.

Conclusion

Entirely basic, then, but on the other hand, no digital extras to confuse the vinyl novice. Rather the Primary E is focused on delivering all the sound this entry level of investment can achieve, and we're not about to argue with that. It's a great entry-level turntable.

SPECS

Pro-Ject Primary E $499

Type: belt-drive, manual
Platter: MDF
Speeds: 33⅓, 45rpm
Outputs: Phono-level
Dimensions (whd): 420 x 112 x 330mm
Weight: 4.0kg

Contact: Interdyn Brands
Telephone: 03 9426 3650
Web: www.projectaudio.com.au

JBL Spinner BT

The cheaper of JBL's first ever pair of turntables, the Spinner BT comes loaded with a phono stage and Bluetooth wireless playback.

SUMMARY

JBL Spinner BT
Price: $649.95

+ Good sound for the price
+ Great looks
+ Phono stage & Bluetooth streaming included
– Unconventional looks

JBL was founded in 1946, but seemingly hasn't had the urge to produce a vinyl-playback machine until now. And it's made two — both are freshly arrived, and both in this group test. This Spinner BT is the more modern and purposeful in both looks and operation, perfectly addressing the younger JBL audience who know their soundbars and smart speakers better than they do their K2s and Everests. Their system might currently comprise just a Bluetooth speaker and a smartphone. For such users a Bluetooth-capable turntable like this would be the coolest possible addition to such a set-up.

And who sells more Bluetooth speakers than anyone else in the world? Why, JBL of course.

And it's true, the JBL Spinner proves the perfect companion for such a Bluetooth-based system (JBL supplied us with one of its new Authentics smart speakers, which did the job very well). And yet the inherent abilities of the JBL Spinner BT mean that it is not limited to the softer limitations of Bluetooth and a less-discerning youth audience: it proved to have true hi-fi credentials, capable of rather more.

Build & facilities

There are two finishes available; we reviewed the more reserved — the platter and fittings all in black and just the antiskate wheel and the edge of the

aluminium platter anodised to a gold finish. But we confess we'd be tempted by the version with orange accents, including a backlight behind the huge JBL logo that dominates the right edge of the plinth, opposite the left buttons to select either 33⅓ or 45rpm speed.

Working up from the business end of the signal chain, the cartridge is from Audio-Technica, the widely-available moving-magnet AT3600L, so you'll have no problem getting replacement stylii (the ATN3600L at around $30) or indeed here replacing the whole cartridge (around $70), since the cart arrives aligned and mounted in a removable headshell (unlike the Sony) which screws onto the aluminium tonearm with its adjustable counterweight and anti-skate dial.

There's not much information on the motor but speed accuracy is held by an optical sensor, "to guarantee perfect pitch" says the company. The belt-driven platter is topped with a supplied felt mat. The supporting plinth is substantially thick, though the full deck weighs only a middling 5.3kg. It has large rubberised and adjustable damped feet to reduce vibration, and a hinged cover to keep out both dust and acoustic feedback.

So there are three ways to take the signal from the cartridge and out of the turntable. The headline ability is Bluetooth wireless streaming, and this includes the third-party vendor codec aptX HD. If you can achieve aptX HD transmission — which requires the codec to be supported by your receiving speaker or headphones as well as the Spinner — then you should achieve a "CD-like" level of sound quality, if that isn't an outrageous way to describe the quality to which your vinyl is being digitised. And do bear in mind what you're doing here, especially if you're deliberately getting back to the analogue joys of vinyl. Listening via Bluetooth means that you're converting your music to a digital format for sending over the wireless link. It's not analogue vinyl sound any more!

Also if you don't have aptX at each end, it's not clear which codec will be the fallback: optional AAC, or the mandatory SBC. Either will drop the quality of the Bluetooth link, and SBC more so than AAC.

Thankfully the Spinner BT can also be a Spinner without BT. There are analogue outputs around the back (no earth cable required here), and these outputs can offer the phono level direct from the cartridge, ready to plug into a phono stage or an amplifier's phono input. Or, if you flick on the 'preamp' switch at the rear, you get a line-level output suitable to feed into any standard amplifier input, or direct into active speakers. That's because the Spinner BT has a built-in (switchable) moving-magnet phono stage. It would require one anyway to raise the level for Bluetooth transmission.

Set-up

Full marks to JBL for the Quick Start Guide: printed, inside the box, and the simplest guide to a turntable set-up we've ever seen — minimal but not too minimal, and pretty much foolproof, even for first timers. We followed it to the letter, except we attached the cables first; it's easier than at the end!

We fitted the platter, a nicely burnished-gold anodised aluminium you'll see under the record's edge, looped the belt in, then fitted the cartridge and the counterweight, balancing it all up with the adjustable feet.

"modern and purposeful looks and operation perfectly address the younger JBL audience who know their soundbars and smart speakers better than they do their K2s and Everests."

Seeing now the complete turntable for the first time, some traditionalists might find it too modernist and youth-orientated, but with a strong youth element to the vinyl revival, we think JBL has hit the nail on the head here, and we loved the look. The plinth rises up thick and sculptured, looking almost rubberised along the ridges at the right side, though it is all actually a sturdy plastic. The oversized logo looks fabulous. The dustcover is not factory-standard but instead a stylishly curved and smoked lid (it reminded us of Jonny Ive's work on the latest Linn Sondek).

We started at phono level via cables, with the little 'pre-amp' slider set to 'off'. Note that Bluetooth won't work while the slider is in this position (something added to the manual as a stuck-in addendum). And be careful when you go the other way, remembering not to blast your phono input with a line-level output.

The other slider is for automatic start/stop of the platter. This is not as automatic as those which lift the arm at the end of playback; it's all manual lifting here, except that the platter will start as you bring the arm over the record, and stop in the other direction.

Performance

Listening first through our in-house phono stage, then, we loaded a recently-acquired orange-vinyl copy of Jeff Beck's 'Blow by Blow'. Not only was the lead-in groove whisper quiet, with just a little right-channel rumble audible (through 12-inch woofers, to be fair), the initial impact of *You Know What I Mean* was tight and bright, from Richard Bailey's drum crack to the percussive and panned funky clavinets (and later fizzy lead synths) of Max Middleton, while soaring centrally above it all the inimitable Mr Beck had every inch of soundstage space he could hope to stretch in. This deck does not sound like a budget deck; it has the resolution and speed of higher-level performance.

"Of the three ways to play, the phono output here is the best quality, the line-level output the most versatile, and the Bluetooth wireless playback the most fun..."

This LP was tight, but not the last word in bass. We loaded an original EMI Australia pressing of the compilation 'Hey Jude', which has some very solid bass in its grooves, especially on *The Ballad of John and Yoko* and on the title track opening side 2; there's also a wonderfully-recorded ride cymbal on the latter, and the JBL brought both out well, especially the ride in the left channel, its fully metallic tings cutting through until replaced by the very forward tambourine over the last verse. Original mixes, original vinyl: who needs the endless rounds of Beatles reissues when the original vinyl sounds this good?

Our standard comparison tracks gave us the opportunity to stack the Spinner BT up against some key rivals, and its own phono stage against its bare output. Keith Jarrett's *Flying pt 1* is a great piano tester, gentle to open and slowly growing with the trio; the piano showed good speed stability (and the RPM app had already shown it just 0.5% below 33⅓rpm with 0.23% wow and flutter) and overall good separation, but the built-in phono stage definitely softened the highs and closed the soundstage slightly when compared with the raw phono output played through a better phono stage, though we did get a little 50Hz hum through from the phono output, and with no earth wire to remove it.

You won't pick this quality difference unless you make the comparison, but know at least that there is useful room to upgrade from that built-in phono stage.

Compared to some rivals we preferred the JBL's more neutral sound to a slightly boxier presentation from a price-comparable Audio-Technica, while the Sony PS-LX310BT sounded extremely similar in nearly every way, including our slight preference for the raw phono output over the softer line-level output.

As for Bluetooth listening, we played the Spinner BT through JBL's own Authentics 500 wireless speaker — a huge pumping performance, though giving us little insight into the turntable's own sound, as everything pumped out of that speaker in the same way!

But headphone playback, wandering round with records in your head: that was marvellous. The Bluetooth range proved significant; when we beamed Malcolm McLaren's single of *Buffalo Girls* to a pair of Sony noise-cancellers we got down two floors and a few steps into the garden before drop-outs intervened; we barely got back in time to flip the single for the unspeakable square-dance version on the B-side. There's no arguing about quality when enjoying such convenience; this is as good as you'll get short of UWB taking over the world, so relax, forget about bit rates, and enjoy it.

Conclusion

Of the three ways to play, the phono output here is the best quality, the line-level output the most versatile, and the Bluetooth wireless playback the most fun. The fundamental level of this turntable is up with the best at the price, which means beyond some at the price; it looks fabulous and it's easy to use as well as simple to set up, partly thanks to that excellent start-up guide.

We reckon the JBL Spinner BT should sell buckets. It may have taken JBL 77 years to get round to a turntable, but on this showing we don't reckon they'll stop any time soon.

SPECS

JBL Spinner BT $649.95

Type: belt-drive, semi-automatic
Platter: MDF
Speeds: 33⅓, 45rpm
Outputs: phono-level, line-level, Bluetooth with aptX HD
Dimensions whd): 435 x 155 x 368mm (without lid)
Weight: 5.3kg

Contact: Harman Australia
Web: www.jbl.com.au

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Lenco LBT-225

Not only is Lenco's affordable turntable impressively built and loaded, it comes with a built-in phono stage, Bluetooth output, and USB recording.

SUMMARY

Lenco LBT-225
Price: $699

+ Great looks and build
+ Solid fundamental sound
+ Phono stage, Bluetooth & USB
– Bluetooth issues on our sample
– Some noise on USB output

It's a clear trend that in this group, three of our four lowest-priced turntables are not simple turntables, but loaded with digital electronics. Lenco has a long history, originally Swiss, revived several times, and currently part of the Commaxx stable of brands in the Netherlands, and again here, this seems like a lot of turntable for the money. The LBT-225 is a belt-driven turntable in a very nice walnut finish, fitted with a glass platter, a carbon-fibre tonearm no less, and the ever-reliable Audio-Technica AT-VM95E moving-magnet cartridge tracking the tunes (which is the same cartridge used on the top $1999 turntable here).

Meanwhile the electronics section includes a built-in phono stage, a Bluetooth output which can pair with headphones or a Bluetooth speaker, and a USB-B socket on the rear to connect with a computer and record your vinyl digitally. Handy.

Build & facilities

The plinth here is no lightweight, nearly 30mm thick (the full turntable is 6.6kg), and that walnut finish looks like a nice dark properly-grained veneer; it fits perfectly. The sub-platter is plastic, but the 13mm green-tinged glass platter on top lends such a touch of class that it's almost a shame to cover it with the provided Lenco felt slipmat.

That snazzy carbon-fibre arm is coated in a clear lacquer and has a 8.6-inch effective tonearm length, angled to a 'J' to bring the green-shelled AT-VM95E cartridge and its stylus parallel to the LP grooves. That cartridge is an old friend, of course — a dual-magnet design with a smooth, rich sound quality, and it tracks very well. A replacement cartridge will be around $80, a stylus $50, and the VM range provides a great upgrade path (see p74 and elsewhere this issue)

After plugging up and levelling (made easy by the Lenco's large and adjustable isolation feet), we settled in to listen to all four outputs of the LBT-225 (sometimes listed as LBT-225WA).

Listening sessions

The power button is up by the tonearm pivot, a little inconvenient, and there was momentary panic when the platter didn't start revolving. The instruction book gets this wrong; it says the platter will start revolving before you depart the arm clip and move the arm over the vinyl. In fact things start revolving only *after* the arm is moved. Phew.

It's a very quiet turntable mechanically. We played side 3 of Jack White's 'Acoustic Recordings', opening with *Love Is the Truth*, which contrasts spacious sound with bursts of action, delicate picking over light toms into full-on strumming with fuller drums and overdubs. Startlingly real it sounded; this is no entry-level vinyl performance.

It even held on to the tricky innermost track, the lively *Machine Gun Etiquette*, perhaps a little less open, the vocal tracked with a little less clarity, but no side-groove noise, and excellent stability, as some stretches of lone piano made clear.

Using both the Sound+Image strobe card and the RPM app on iOS poised over the Lenco, it

showed as a tad (0.77%) fast at 33.59 rpm, while the RPM app put wow and flutter at a perfectly acceptable 0.15%.

Next we upped the groove rate by turning to the 12-inch single of Tears For Fears' *Sowing The Seeds Of Love*, and were very impressed by the Lenco's handling of this extremely dense mix, some parts 'Wall of Sound', some *I Am The Walrus* effects madness, some pumped-up 'Pepper', but with a very pushed snare crack cutting through from start to finish. Thanks to a sublime friendliness for which we can credit the A-T cartridge, this difficult piece was never harsh and yet allowed that snare the crack it needed, even while celebrating the soundscapes to either side. We had this playing very loud, because audible distortion was so low that higher volumes were encouraged!

To reveal the subtlety of this system, we turned to the less frenetic but deeply cool pace of Miles Davis' 'Nefertiti'. We had this up very loud for the lead-in and there was a little deep grind audible above the noise floor, but mid-LP we switched the cables to our own reference phono stage. The grind vanished, replaced by earth noise; the provided cable did not have the requisite flying earth lead, so we substituted our own, and not only was the background quieter but the clarity and soundstaging were taken to another level.

That shows that the Lenco has more to give beyond the abilities of its own phono stage, enjoyable as it was, so there's another available upgrade path for you.

"delicate picking over light toms into strumming with fuller drums and over-dubs... startlingly real it sounded; this is no entry-level vinyl performance."

The Bluetooth output uses only the base-level SBC codec, and we had a glitch with getting it to connect. It can often be tricky to pair headphones with a Bluetooth turntable — there's no display anywhere, so all you can do is press both buttons and hope it works. The Lenco declined to pair with anything, though Lenco's technical team kindly sent us a video of their LBT-225 pairing perfectly with everything.

The USB output worked beautifully, the incredibly slow arm drop (just over six seconds: we dont recall any turntable ever being slower) giving time to get back and hit the red button without missing a thing. The tone of our recordings was very good, the sound quality matching rivals near the price; the only issue with the USB output was a consistent low-level buzz on recordings.

Conclusion

Competitors notwithstanding, we think this Lenco LBT-225 to be an absolute bargain. It performs to the level of any rival at the price and beyond most, while its build (carbon-fibre arm, best-seller cartridge, walnut plinth) and facilities (phono stage, USB and, if it works for you, Bluetooth output) offer a great deal extra. If you like the classic looks over, say, the modernist JBL in the next review, it's an excellent buy. +

SPECS

Lenco LBT-225 $699

Type: belt drive, manual

Speeds: 33⅓, 45pm

Outputs: phono-level, line-level (RCA switchable), Bluetooth out (SBC), USB-B digital out

Dimensions (whd): 418 x 123 x 346mm (cover 410mm high when open)

Weight: 6.7g

Contact: Audacity Australia

Telephone: 03 9645 3887

Web: www.audacityaustralia.com.au

Rega Planar 1 Plus

Rega bolts a phono stage directly onto one of its low-mass turntables for the first time. Unsurprisingly, they didn't do it quite the way you might expect.

SUMMARY

Rega Planar 1 Plus
Price: $849 ($899 walnut)

+ Clean lively sound quality
+ Good built-in phono stage
+ Very easy set-up

– No phono-level output

It would be a strange turntable round-up that didn't feature Rega, so here's the Rega Planar 1 Plus. This is essentially the company's entry-level Rega Planar 1 turntable, but with the 'Plus' bit indicating that there is a phono stage built-in, so you can plug it directly into a line input of any amplifier or active speaker.

As we're seeing in this group, the inclusion of a phono stage is not uncommon on turntables at this price. But until this Planar One Plus models first appeared in 2018, it was certainly uncommon at Rega. Yet the UK company, which still designs and assembles every product by hand in the south-east of England, had the technology available, because it makes standalone phono stages. Indeed the 'Plus' is fundamentally the Planar 1 turntable with Rega's Fono Mini A2D phono stage attached.

It seems an obvious combination. Except for two things. Rega is always going on about minimising weight on its turntables; the more expensive models get increasingly skeletal and use increasingly esoteric engineering materials to achieve rigidity without mass. So clearly bolting a block of electronics underneath is going to compromise that concept — which may be why in the five years since its release, no higher model has been given the Plus treatment.

The other thing is that there's not much of a price advantage in bringing them together.

The Planar 1 Plus retails for $849 in black or white, $899 in the walnut finish added in 2002 (which also gains a smoked rather than clear lid). The plain Planar 1 is exactly $200 cheaper, with the

standalone Fono Mini A2D at $249 — so it would be only $49 extra to buy the separate products and have a standalone phono stage which you could then keep distanced from the sensitive cartridge electronics. Or get the combination Planar 1 Plus and use the $50 saving to upgrade to the walnut finish.

But it's not quite that simple. We were in the happy position of having the separate units to hear at the same time as the combined Plus. The comparison was intructive, and revealing.

Set-up and connections

Place the Planar 1 Plus next to the Planar 1, and the two are near-identical — same platter, bearing, RB110 tonearm, Carbon moving-magnet cartridge, 24V synchronous AC motor and acrylic plinth. Setting up is easy, and fuss-free, too, with Rega helpfully marking exactly where the counterweight needs to go. And that's it, there's no need to adjust anything else on the turntable. There's not even an earth spade to connect, for two reasons — firstly, Rega never uses earth spades, because their turntables earth through the arm cable's own screening. Secondly, the Plus is unusual in that its built-in phono stage is not bypassable — you cannot take the phono-level signal out of this turntable (or not easily, anyway). The phono stage is part of the product. That makes it super-simple, but does preclude a future upgrade with a better phono stage.

Performance

With both separate and combined turntables and stages running, it didn't take long to discover that they don't sound the same. So is the Plus compromised by the convenience?

No, it sounds better. But how can that be? Well, we gather that Rega hasn't simply taken the existing Fono Mini A2D and bolted it under the deck. It has been tweaked, notably removing its own power supply and the whole USB output section, which allowed output to a computer for recording.

So if you want that USB option, that's another reason to buy the separates. Otherwise you can actually benefit from the combo product, because Rega has used the saved money to improve the audio quality of the phono stage. That's a fair trade, especially as the Planar 1 Plus sounded brilliant.

Rega has a knack for agile and enjoyable dynamics, and the Plus is very much in the same mould. It's got the drive, punch and timing to keep the momentum of Nirvana's 'Nevermind', with *Come As You Are*'s guitar strums and basslines pulled taut, the layers of grungy distortion impressively spread out as the shouty chorus kicks in. Even through all this, Kurt Cobain's surly singing emerged with clarity, while the level of detail in the music was impressive for the level of turntable here, each string pluck feeling oh-so-real, with very definite leading edges to every note.

"It didn't take long to discover that they don't sound the same. So is the Plus compromised by the convenience? No, it sounds better. But how can that be?"

The Plus delivered an open, spacious presentation, too. The saxophone in Tom Waits' *Midnight Lullaby* was clean-edged, sprightly, plenty of headroom to spare — never bright, but the clarity sparkling against the muted bar-room piano and Arni Egilsson's slow and simple bass work.

Conclusion

So while the overall sound was very similar to the Planar 1 and external Fono Mini A2D, the Plus sounded cleaner, leaner, and at times simply a little better; the Planar 1/Fono sounded thicker by comparison. This new Plus clears a few cobwebs away, and gives Rega a product which can provide convenience without at all compromising Rega's reputation for vinyl sound quality.

SPECS

Rega Planar 1 Plus $849/$899

Type: belt-drive, manual
Speeds: 33⅓, 45pm
Output: line-level only
Dimensions (whd): 447 x 117 x 360mm (lid closed)
Weight: 4.35kg

Contact: Synergy Audio-Visual
Telephone: 03 9459 7474
Web: www.synergyaudio.com

Pro-Ject Debut Carbon Evo

New colours are just the start of an evolution which led to the latest and undoubtedly greatest in Pro-Ject's line of Debut turntables.

SUMMARY

Pro-Ject Debut Carbon Evo
Price: $1099

+ Top-rank sound at the price
+ Electronic speed change
+ Design maturity & colours

– No extras
– Not without rivals

It's no surprise to find a second Pro-Ject turntable in our group: the company has more models (and more versions of those models) than any other company. Appropriate, too, that our second Pro-Ject is a 'Debut', a model name that has been on Pro-Ject's books for over 20 years, back at the end of the company's first decade when the original Debut emerged from efforts by Lichtenegger and his UK distributor and longtime friend Laurence Armstrong to create a new record player that a younger generation could afford, but which could deliver as close to high-end sound as was possible at the price.

The Debut has since been through many iterations as Pro-Ject's most popular turntable design, most recently undergoing an 'Evolution' for this fifth generation, the Debut Carbon Evo. While its brief for maximum sound quality at the price means it doesn't have the larger convenience items like wireless or a built-in phono stage, it proves a triumph of calculated risk-taking in audio quality, and also brings something which may attract many users — a swatch of available colours, nine in all.

Equipment

Among the upgrades for the latest Debut were an improved motor mounting suspension, new damped feet that are height-adjustable to assist in levelling the deck, and a heavier steel platter now weighing 1.7kg, and with a thermoplastic elastomer (TPE) damping ring on the inside to reduce resonance.

Most welcome in terms of ease of use is the addition of a rocker switch on the bottom of the deck which allows you to switch speeds. No more removing the entire platter to manually move the belt; now you just flick the switch when you want to go from albums to singles.

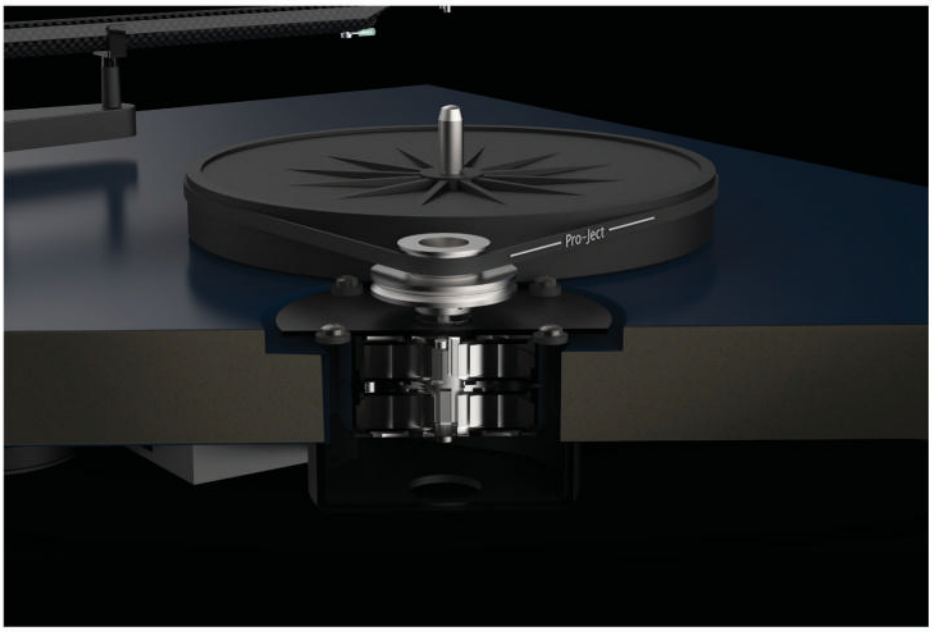
The colours expand the gloss white, black and red with five lovely satin options of white, black, 'fir green', 'golden yellow', and the pictured 'steel blue'. Sensibly Pro-Ject has also retained the popular real walnut veneer option. And all theoretically at the same price, though it's worth checking your colour carefully, as some get discounted at times.

Extending the colour bonus is a 'Colourful Audio Debut System', which bundles this turntable with Pro-Ject's MaiA S3 amplifier and Speaker Box 5 S2 speakers, the latter similarly available in any of the satin finishes or walnut, system price $3209, but again, we've seen significant discounts at times.

So visually there's a real sense of the Debut reaching maturity with the Debut Carbon Evo, from the clean lines and lack of ornamentation to the upmarket new finishes.

The 'Carbon' part of the model name comes from the 8.6-inch one-piece carbon tonearm, a material more common in higher-end turntables, being lightweight and incredibly stiff, so decreasing unwanted resonance. There's a little play in the bearings, but it's the best tonearm yet to accompany a Debut deck.

The cartridge is a widely-employed favourite, Ortofon's 2M Red, renowned for a precise insightful sound with a particularly full and expressive midrange. Of course you might, when it comes to replacement time, consider this a point for further upgrade. We note that in the States, for example, this



All about sound: Pro-Ject's long-running Debut series eschews the extras to focus entirely on delivering the best sound for the price.

turntable is shipping with a Sumiko Rainier cartridge, a range which rises to the Sumiko Olympia and Moonstone cartridges, any one of which would fit and upgrade the Debut Carbon Evo, along with other options. The Rainer sells here around $300, while a replacement Ortofon 2M Red is available for half that, partly because of its wider availability, and partly because the Sumikos are individually handcrafted in Yokohama.

Performance

Once out of the box, the Debut Carbon Evo was up and running remarkably quickly. The one thing not included in the package is a mat for the platter, so unless you have one lying around, we'd recommend at least a felt mat (Pro-Ject's is $25) or cork ($49) or leather! ($69) as an additional purchase.

Other than that it was a case of adding the belt (it still has one, and a thick one too; you just don't need to move it for speed change), platter and weights, attaching the included dust-cover, and we were ready to attach the phono cable to our amplifier's phono input and start spinning the black discs.

Its rich, full-bodied tone came as little surprise, despite the eminently reasonable price. Pro-Ject has long proven its ability to offer up a magnificently plush midrange, especially when there is a 2M Red cartridge in residence. Vocals were a particular treat when given so much warmth and held up within a soundstage that was solidified by plenty of weight in the bass.

This sound signature comes partnered with remarkable detail and texture. Where competitors might beef up their sound to disguise a lack of real insight, Pro-Ject here proved its longstanding aptitude for making a deck that is both easy to listen to casually and ready to service deeper, more analytical sessions. Such an easy and unfussy nature is invaluable for a turntable of this type, at this price, given the vast array of products with which it might be partnered.

But equally importantly the new Debut had the ability to engage, with dynamic expression and rhythmic precision significantly above what we might expect at the price. The Debut Carbon Evo kept our attention fixed with its keen ear for emotion and just enough drive to punch out staccato rhythms.

Compared with some competitors, it was a relatively laid-back approach. Compare it with a similarly-priced Rega Planar, say, and Rega's characteristic spritely and lean performance would deliver a slightly tighter sound overall. But the Evo's richer sound is convincing nonetheless, entirely in keeping with Pro-Ject's overall character, and no less attractive because of it. Whether the Evo is the best player for you is down to whether you prefer its fuller and more relaxed character.

Conclusion

While there are no phono stage, digitisation or wireless abilities here, the Debut Carbon Evo continues the success of the Debut concept, maximising sound quality at a decent price through careful design choices, so that its vinyl performance notches up from entry-level to something rather higher — an upgrade from your first turntable, rather than the 'debut' of its name. And there's further evolution available via cartridge upgrade options.

For those in the market for a turntable around a grand, we'd sugget that the Pro-Ject Debut Carbon Evo should be a compulsory audition — once you decide on a colour. +

SPECS

Pro-Ject Debut Carbon Evo $1099

Type: Belt-drive, manual turntable

Speeds: 33⅓rpm, 45rpm

Outputs: phono level

Dimensions (whd): 415 x 118 x 320mm, 415 x 365 x 405mm with dust cover open

Weight: 5.6kg

Contact: Interdyn Brands

Telephone: 03 9426 3650

Web: www.projectaudio.com.au

Cambridge Alva ST

The lesser of Cambridge's two turntables nevertheless offers significant value and brings line-level output plus wireless Bluetooth listening with aptX HD.

SUMMARY

Cambridge Alva ST
Price: $1199

+ Great performance
+ aptX HD Bluetooth
+ Onboard phono stage

– Fully manual
– Counterweight markings

Despite having been in the hi-fi business since 1968 in some form or other, Cambridge Audio is another company which didn't build a turntable until after the opening of the current century. Then it took more than a decade to make its next, the Alva TT, which the company claimed was the first turntable in the world to offer aptX HD Bluetooth streaming.

An Alva TT V2 arrived in 2022, just three years after the original, with a pre-installed high-output moving-coil cartridge and a built-in phono preamp, plus continued support for aptX HD Bluetooth.

But Cambridge Audio also used 2022 to release the Alva ST, on test here. This more affordable deck also has a built-in phono cartridge — here for moving-magnet, rather than moving-coil — and also a built-in phono preamp (exactly the same one used in the TT V2), as well as support for aptX HD Bluetooth (again, the exact same circuitry). It even has exactly the same tonearm as the Alva TT V2.

But this turntable does have two very obvious significant differences from its Alva TT V2 sibling.

First, it is belt-drive rather than direct-drive. And second, its retail price is currently not much more than a third that of the Alva TT, following tactical drops in its early days under Synergy Audio-Video. Distribution has since moved to BusiSoft AV, which doesn't have any product information on its website (indeed as we write, Cambridge Audio doesn't even appear there), but from BusiSoft's sister retail operation Addicted to Audio, however, we can see that the current price of the Alva ST has settled at an impressively affordable $1199 which is, it's worth noting, some $600 down from its original 2022 launch price. So what do you get for the money?

Equipment & build

One of the things you get for your money is a very good-looking turntable. The plinth is MDF, but it gets a 1mm-thick aluminium top plate for rigidity, and a layer of EVA (ethylene vinyl acetate, somewhat appropriately) between them to absorb vibration. You don't here have the engineering thermoplastic used for the platter of the Alva TT; here it's a simple die-cast aluminium alloy, though 17mm high, and finished with a 5mm-thick rubber mat to damp any resonance. The mat is thick enough that Cambridge has been able to mould a circular depression at its centre to accommodate the many LPs whose label area is higher than their groove area, a very welcome feature not often found on platter mats.

In common with almost all belt-drive decks, the Alva ST's platter is supplied separately inside the packaging, requiring you to fit it (and the belt) yourself, an easy job, and giving you the opportunity to check how everything works, a rarity in hi-fi these days. On the Alva ST you will observe that the brass drive pulley is fixed directly to the shaft of the DC drive motor, and that there is no suspension — the motor is fixed directly to the chassis.

The Audio-Technica AT-VM95E cartridge makes its second appearance in our round-up this issue (one more to come!): pre-installed, pre-aligned and offering the useful upgrade path via higher compatible AT cartridges (see below). In the box you also get a clear Perspex turntable cover, a decent set of phono interconnects complete with earth wire, and an Ortofon 'see-saw' style stylus down-force gauge. This last turned out to be an essential accessory, as the counterweight on the Alva ST's tonearm has some lines engraved on it, but no indication what downforce these markings might provide.

The outboard switch-mode power supply is a plug-pack type whose lead is fitted with a standard DC power plug.

Listening sessions

We mostly used the onboard phono preamp, connected to a high-level input on our preamplifier, along with a brief assessment with this phono preamplifier bypassed, just to gauge the ST stage's sound quality compared to the external phono stage we usually use.

Our first LP played was one by Dutch pianist Jeroen Van Veen, Satie's: 'Gymnopedies, Gnossiennes, And Other Works', on which van Veen stretches the concept of slowness to the extreme. Despite his incredibly slow tempi, we heard no wow or flutter effects that could be attributed to the Alva ST, while speed accuracy was confirmed against a recently-tuned piano, where our own chords proved in perfect tune with van Veen.

We checked for low-frequency noise (rumble) using a special test record that is completely silent, and there was no mains hum or unwanted low-frequency noise.

Sonically, Audio Technica's AT-VM95E quickly confirmed again why is one of the best-selling cartridges. It has a smooth, rich sound quality that makes for very easy and very enjoyable listening, particularly on well-worn records. The Alva ST/AT-VM95E combo delivered all the songs on Neil Young's wonderful 'Harvest' smoothly, fluidly and very musically, particularly on its most inappropriately-named track, *The Needle and the Damage Done* ('inappropriately' here only because the AT-VM95E tracks so beautifully that it will surely do your albums no harm at all).

On Mary J. Blige's 'No Drama' the Cambridge Audio Alva ST turned in a cohesive and musical performance with a surefooted and robust presentation that remained unflustered even as the song became more demanding. All of the finer details in the work were clearly audible and the music was rendered with a lovely composure, though this was perhaps partly because the extreme highs were just a little rolled off in level.

We span up Beethoven's Symphony No.5 and the ST did an outstandingly good job of rendering this mighty symphony's scale and power. The extraordinary orchestral dynamics were delivered fluidly and in their entirety, while at the same time the resolving power of the combo was such that we were easily able to follow the subtle instrumental strands that help culminate the climactic moments.

Some might argue that the Audio-Technica AT-VM95E cartridge is not an ideal price-match for the Alva ST — an $80 cartridge on a $1200 turntable. There is a simple solution to this, which would be to replace the VM95E stylus in the cartridge with an AT-VM95EN stylus that retails for around $200, the 'EN"s diamond is nude-mounted directly to the cantilever, compared with the ordinary 'E' version glued onto the end of a metal shank itself glued into a hole in the cantilever — a technique called 'bonding'. As you can see elsewhere in this issue, Audio-Technica's AT-VM95 platform is extraordinarily flexible, with multiple styluses available. You could keep a Microline (ML) diamond stylus around just for first plays of brand-new LPs where you're making a digital copy.

As for that Bluetooth, it means you can put the turntable anywhere you like (though obviously you still need to provide power), able to send the turntable signal to any Bluetooth speaker within range, or listen to the spinning record via a pair of Bluetooth-equipped wireless headphones. If you have a Bluetooth device which has aptX HD, the optimal connection of 576kbps should sound pretty good; otherwise you'll drop to either AAC or SBC codec quality, which is far below the quality of a cable. A cable is still best! Bluetooth should be kept for convenience.

Verdict

The Cambridge Audio Alva ST performs very well and is certainly value for money — even more so if you might otherwise have budgeted for an external phono stage and particularly a Bluetooth transmitter. But what makes it stand out from the crowd at this level is that it just oozes class. The Cambridge Audio Alva ST looks fantastic for the money, not only a pleasure to own but something you will be proud to put on display in your home. +

SPECS

Cambridge Alva ST $1199

Type: Belt-drive, manual turntable

Speeds: 33⅓rpm, 45rpm

Outputs: phono level, line-level, Bluetooth (SBC, AAC, aptX HD)

Dimensions (whd): 435 x 139 x 367mm

Weight: 9kg

Contact: BusiSoft AV

Web: www.busisoft.com.au

JBL TT350 Classic

JBL's higher-level turntable leaves behind the 'youth' culture looks of the Spinner BT and goes for modern vintage. But how does it sound?

From the other turntables in this group it's a bit of a price jump to our final vinyl spinner this issue. But this TT350 comes within our group's $2000 price ceiling by a whole dollar — and besides, this is a deck of particular interest.

We've already seen the JBL Spinner BT perform admirably at its price level of around $650 (see p60-62). But that youth-orientated Bluetooth-equipped turntable was preceded in its announcement, if not its Australian arrival, by this more upmarket TT350 Classic. And that makes this the first-ever turntable released by the Harman/Samsung-owned US marque in all of its 78 years.

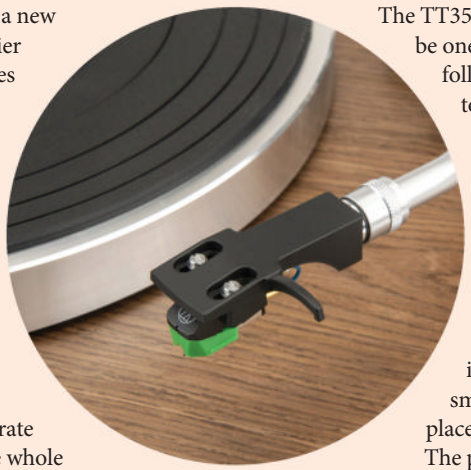
It was launched as part of the company's 'Classic' series, specifically with a line-up of JBL separates components around a new SA550 Class integrated amplifier which purportedly takes its cues from a 1966 SA600 amplifier designed by Bart Locanthi. The Classic range also now includes three sources: an MP350 high-res music streamer, a CD350 CD player — and this, the TT350 Classic turntable.

These electronics follow up on the limited edition SA750 integrated amplifier launched in CES 2021 to celebrate JBL's 75th anniversary, but the whole range was surely inspired by the success of JBL's Classic loudspeakers, led by the white-cone 12-inch woofers and Quadrex waffle-cut grilles of the L100 Classics, which are now in a MkII form, and have been joined by the smaller (but still not exactly compact) L82 Classic (eight-inch woofers, also now MkII) and L52 Classic (5.25-inch woofers). The original L100 was a Sound+Image award-winner; we loved the way it sounded, and also how it eschewed the trend of tower-like narrow speaker design, using the Classic tag to justify having those wide and wonderful 12-inch drivers on display.

The idea of all this retro loveliness is surely that you can now buy a complete JBL Classic system, from CD, vinyl and streaming through amplification to the speakers which have long been JBL's focus.

But that doesn't limit JBL's TT350 Classic turntable to life in a JBL system. It performs to a level which should shine in any price-comparable system.

Build & facilities



The TT350 Classic does not appear to be one of those turntables which follows the 'sheer mass' approach to vinyl replay, but neither is it skeletally light, like a Rega. So while it weighs less than the Cambridge at 7.5kg, it is nevertheless half as heavy again as the lesser JBL turntable, the Spinner BT, and yet similarly low (exactly the same height indeed, whether with its smoky Perspex dust cover in place or not).

The pricier turntable does gain a few centimetres in width and depth, however, and it certainly ups the aesthetic delight, managing to look both sleekly modern and nicely 'classic', if not quite vintage, at the same time. The plinth is MDF on the inside but you can't see any of that: the bulk of the turntable is covered with

SUMMARY

JBL TT350 Classic
Price: $1999

+ Clean and neutral sound
+ Lovely looks
+ Upgradeable styluses

– Phono-level only
– Prominent silver cankles

an attractive Natural Walnut veneer (some JBL texts promote this to "a solid walnut clad plinth", a somewhat ambiguous way of describing the nice veneer). Our sample gained a rudely emblazoned 'Not For Sale' transfer on the bottom right corner.

Meanwhile the front edge gets a nice centimetre-thick slab of aluminium which probably explains much of the weight difference over the Spinner BT. This frontage has a large backlit 'exclamation mark' logo to the left, which lights up red when the deck is in standby and in JBL orange when it is running. Right of the illuminated logo, beyond a vertical groove in the aluminium fascia, are two buttons, marked 33 and 45, which you press to start the platter spinning once the deck is powered up. And in a lovely design detail, the aluminium either side of the groove has a differently brushed finish — vertical strokes to one side, horizontal to the other. You barely notice except that the two sections reflect light differently, so creating a lovely contrast.

It's good to see that JBL exclamation mark appearing in full again — it got tucked away into the top of the 'J' on JBL's modern logo (well, modern since 1967). Before that date, the exclamation mark had been JBL's prime identifier, a logo created indeed by legendary designer Jerome Gould, who would later create the Pepsi logo, among many others.

The method by which the platter is spun up might be considered the biggest difference between the lower and higher JBL turntables. The lower Spinner BT is belt-drive; this TT350 Classic is direct drive, with the motor driving an idler wheel which directly turns the sub-platter (which is masked partially here under a sturdy metal plate) and so the main platter.

"The lower of the two JBL turntables in this issue is belt-drive; this higher TT350 Classic is direct drive – which might have seemed topsy-turvy in hi-fi until recently..."

Not much more than a decade ago, this would have been topsy-turvy in the world of hi-fi, where audiophile decks were all belt-drive, and direct drive was kept for DJs who needed rapid spin-ups. Why was this? The main objection to direct drive was cogging, where there are small bumps in rotational speed as each pole of the motor magnet gives its impetus to the revolution. But in recent years new techniques seem to have reduced the importance of cogging and the objections to direct drive; VPI, Rockport, Technics and others will happily sell you DD turntables upwards of $30k. (The uber-high-end however, is sticking with its belts.)

On the TT350 the rotational speeds gain further security by being locked with a speed sensor "for perfect pitch' says JBL.

The die-cast aluminium tonearm is S-shaped, nine inches measured direct from pivot to stylus, and it comes with a universal mount ready to receive the supplied removable screw-in headshell with its pre-installed and aligned green Audio-Technica AT-VM95E moving-magnet cartridge, the cartridge's third appearance in this round-up! As noted elsewhere, it's a highly-regarded cartridge for its price (replacement around $80 and styluses around $50), and allows owners a whole raft of easy upgrades, temporary or permanent, by simply swapping in a stylus or headshell with one of the higher VM-range styluses. Audio-Technica has just released a bundle of VMs for exactly this purpose (see p74 and elsewhere this issue), and this JBL turntable would be a perfect deck to reap their benefits.

The TT350 also allows you to adjust the tonearm's vertical tracking angle, making it possible (if slightly complex) to upgrade to an entirely different size of cartridge.

Set-up and performance

It does look lovely, the TT350 Classic, and it's a breeze to unpack and put together. We did read the manual, but anyone accustomed to turntable set-up won't need it, and things are simplified still further by the direct drive, as there's no belt to loop into place (or to move

for speed changes). We simply took out all the bits, carefully put the platter and its rubber mat in place, and then tweaked the feet a little to get things completely level in all planes. The feet are nicely adjustable, and damped to help reduce vibration, if rather large, and silver, and occupying not much less height than the main fascia, so very prominent if the deck is up on the top shelf of a rack. They might have been better disguised in black, floating the pinth.

We attached the headshell to the arm, pushed the counterweight up until the arm was floating, and then applied the requested 2g of tracking force by rotating the counterweight with its notched weight guide, and then putting the same number onto the anti-skate dial — which was a little hard to be entirely accurate, as the notches there are so small.

Final tasks: connect the cables, and put on the dust cover — cover hinges can often be a strain, immensely strong things that snap together madly, but these worked well once we had them on the right way round. The dust cover is rather different to that on the JBL Spinner BT — tinted Perspex but angled slightly inwards to create an Isosceles trapezoid from the front, and with the corners very tightly radiused to create corners rather than curves, as opposed to the friendlier wide curves around the cover of the Spinner BT, which we rather preferred. But it does the main job of dust and noise isolation, if not entirely, as the cover settles on little buffers that leave a very small gap around the plinth.

We had the TT350 Classic in our system for nearly a month, and it never put a foot wrong in terms of vinyl replay. Surface noise was low, so low on some new LPs that there was no vinyl giveaway at all, and we sometimes forgot the nature of our source and were surprised when the end groove appeared.

The January sales had yielded us a pair of bargain 180g Prefab Sprout LPs, and 'Swoon' provided a good indicator of the TT350's spry ability to keep the rhythms tight and punchy as they were dragged from the grooves: a punchy bass kick for *I Never Play Basketball Now,* a perfectly snappy but non-intrusive snare, and impressive clarity as the layers of guitar built up.

Nor was this snappiness coming at the cost of tonal leanness; the lush landscape of *Couldn't Bear To Be Special* was open yet rich, spacious yet full, the bass guitar and synth solid — not massive in proportion, but even-handedly delivered without any hint of bloat.

Speed was good under that sensor regimen; the RPM app measured it at -0.43% for speed (fractionally slow) with respectable wow and flutter of 0.25%. Stability in the moment seemed beyond reproach; our standard piano tester of Keith Jarrett's *Flying Pt 1* was not only rock-steady even on long held notes, the clarity of sound showed the invested extra dollars here: we heard pedal movements over the intro that we haven't noticed before, and we've played this track on every turntable through our offices in the last 20 years!

Jazz or rock, classical or dance, it didn't matter — nor should it, since a good turntable doesn't care about genre: a well-designed system delivering a tightly-timed neutral sound serves everything, and that's what the TT350 Classic brought to our music.

One extra bonus: that rubber mat underhangs the edge of the vinyl by a few millimetres, enough to make removing the LP foolproof — no pulling and accidental fingernail scratches here!

Conclusion

It seems likely that the TT350 Classic will sell itself on its brand and its lovely looks. As it happened, our usual Sound+Image reference system is equipped with JBL speakers that have 12-inch woofers, so we can attest to the system match there. But this is a deck that will shine through any high-quality system: easy to set up, easy to use, easy to upgrade later, with its included Audio-Technica cartridge providing a clarity of vinyl sound that ticks all the boxes for speed, tone and straightforward wonderful music. It was a great deck with which to end our vinyl round-up this issue, and we were rather slow to pack it up for return...

SPECS

JBL TT350 Classic $1999

Type: Direct-drive, manual turntable
Speeds: 33⅓rpm, 45rpm
Outputs: phono level
Dimensions (whd): 449mm x 155mm x 395mm
Weight: 5kg

Contact: Amber Technology
Telephone: 1800 251367
Web: www.ambertech.com.au

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SAVE THE DATE: 05-07 APRIL 2024

And there's more…

There's always something new in the wonderful world of vinyl; here are some of the latest releases, from cartridge solutions to full-on high-end decks.

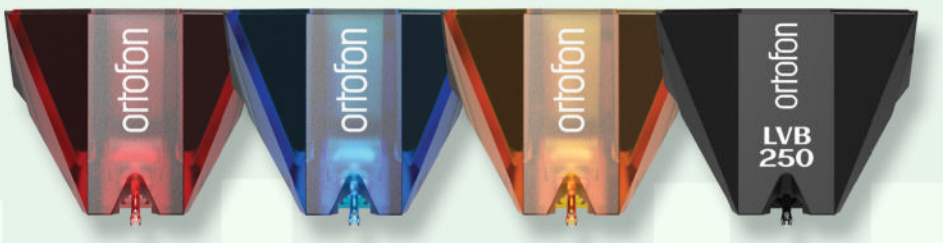
Audio-Technica Hi-Fi Cartridge Set $896

We reckon this is a great idea — a bundle of three different Audio-Technica VM95 styluses, each mounted in a cartridge and headshell; the set also comes with a polycarbonate case to protect the cartridges from UV light and a tack-based stylus cleaner using polyurethane gel. The price of $896 represents a saving of around $100 on the headshelled-cartridges even without the extras.

Why three cartridges? Because the styluses are of different quality, so you could, for example, use the orange AT-VM95EN's elliptical nude stylus for day-to-day vinyl playback, but easily unscrew the headshell and pop on the superior Microlinear stylus-equipped red AT-VM95ML for dedicated listening sessions, while still keeping the brown AT-VM95SH with its Shibata stylus for special occasions — such as copying a new LP for a back-up digital copy. **audio-technica.com/en-au**

Musical Fidelity M8xTT $18,000

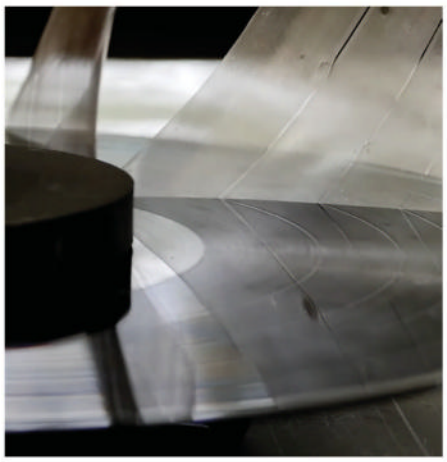
Described as "a *High-End turntable with radical concepts and innovations originating from its legendary predecessor, the M1 from 2004,*" MF's return to vinyl replay certainly looks very similar to the 2004 model, but being now a sister company to Pro-Ject, the former SME arm is replaced with a bespoke TA10 10-inch arm (the deck is around $15k without the arm); no cartridge is included. The turntable follows high-mass high-isolation principles, weighing a stonking 31.5kg, which includes a 10kg damped aluminium platter and a heavy aluminium record puck. Outputs are available on both phono-level RCA and balanced XLR outputs for moving-coil cartridges. **audiomarketing.com.au**



Ortofon 2MR cartridges for Rega $various

Ortofon has a brand new range of 2MR cartridges, which adapt the popular 2M cartridge range with a specially-designed housing suitable for the requirement on Rega turntables for low form-factor cartridges. In the 2MR series, new narrow cartridge housings promise to allow quick and easy mounting with just two screws, and no need for tonearm spacers, shims or modifications.

There are seven models in all, including a 78rpm cartridge at $209, and a Mono model at $549. The other five follow Ortofon's usual colour scheme: the 2MR Red at $159, Blue at $329, Bronze at $699, Black at $999, and the Black LVB 250 at $1649, with a Nude Shibata diamond on a boron cantilever. There is full compatibility with the Ortofon 2M series styli throughout the 2MR range.



Record Restore $89.95-$169.95

Secret Chord Analogue, a company based in Wentworth Falls. NSW, has a new flagship vinyl record cleaner which expands on the methods used by the former Vinyl Record Cleaning System (reviewed in *Sound+Image* some years ago), using a liquid formula that fills the grooves then dries into an emulsion which is peeled away, taking dirt and other binders with it. You can buy the liquid alone, or the full kit to make the spinning and storage easier. **secretchordanalogue.au**

Luxman PD-191A $18,500

Luxman has a new flagship in the PD-191A turntable, with an original statically-balanced tonearm using special bearing technology; this was apparently two-and-a-half years in joint development with Japan's SEAC, .

Luxman's own high-torque DC motor uses a MEMS reference clock and sine-wave PWM/PID speed-control programming, ensuring grip and accuracy for the 5.2kg 35mm-thick diamond-cut aluminium platter. A gorgeous rosewood-stained natural-wood plinth front completes the offering. There's no cartridge included; Luxman points you to its $3299 LMC-5. **audioactive.com.au**

Cyrus TTP $8499

Cyrus Audio has partnered with "*a hugely skilled and vertically integrated German engineering company*" to launch its first ever turntable, the belt-drive Cyrus TTP, with plinth and platter both precision machined from solid aluminium blocks, a lightweight tonearm, and electronic speed change via simple buttons on the deck. No cartridge as standard, and no guidance; consult your dealer. **indimports.com**

Pro-Ject Perspective Final Edition $unknown

A second deck sporting a transparent plinth: Pro-Ject has a new version of the 1999 6.9 Perspective turntable which first launched the Austrian brand into the high-end space. It is, however, a limited release of 400 units, not yet, if ever, available in Australia. And these Final Edition releases are just that — final, signalling the end of a model's "manufacturing arc", according to the official press release. But there is a different cartridge at the end of the 9-inch carbon-fibre tonearm now, an Ortofon 2M Bronze. Personalised certificate of ownership included; serial-numbered plaque on request. Good luck…**interdyn.com.au**

DS Audio ST-50 stylus cleaner $139

Not new — but we've been using one ourselves for years without ever mentioning it in the mag. It's a square of clear urethane resin gel in a square metal box, into which you lower your stylus to remove dirt and fluff. When the gel gets dirty, a run under the tap cleans and restores it. **absolutehiend.com**

LC3

The room where it happens? We can only imagine what the Fraunhofer Institute for Integrated Circuits IIS in Erlangen looks like: the location where codecs are developed for Bluetooth and beyond...

A NEW CODEC FOR BLUETOOTH AND BEYOND

Fraunhofer's research labs are where some of the world's most prominent audio codecs have been made. And they have a new one — LC3. We were a bit rude about it when first we wrote about it, and our penance was a long briefing by two European Fraunhofer engineers. It proved very interesting indeed. So read on for all you need to know on the main audio codec which will take over our mobile listening as Bluetooth LE gains traction — and for a few home truths about digital audio. INTERVIEW: JEZ FORD

An off-hand comment about a new Bluetooth codec brought us an invitation to talk with audio engineers at Fraunhofer, the world's leading applied research organisation. We took them up on the offer to talk about their new pair of codecs, while also discovering that they think high-resolution audio, and lossless high-res in particular, is mainly marketing spiel — a waste of the audio consumer's energy and money.

This interview is long, and needs context. The previous piece was an editorial comment about the new version of Bluetooth, Bluetooth LE (for Low Energy). Bluetooth LE will allow

*GLOSSARY

Bluetooth SIG: The Bluetooth SIG (Special Interest Group) is a non-profit organization that oversees the development and promotion of Bluetooth technology. Founded in 1998 by Ericsson, IBM, Intel, Nokia, and Toshiba, it serves as the governing body for Bluetooth technology, defining the specifications, managing the qualification program, and promoting the technology, while ensuring interoperability among Bluetooth-enabled devices.

Bluetooth PCLA: a Patent/Copyright License Agreement, which in this case covers the parameters for approved use of the LC3 codec within the relevant Bluetooth specification.

PEAQ: Perceptual Evaluation of Audio Quality, a method described in the International Telecommunication Union (ITU) recommendation ITU-RBS.1387 and widely used for computationally estimating the quality of perceptually-coded audio signals without using subjective listening tests. As Fraunhofer itself has pointed out, many reports have highlighted clear limitations of the method, particularly where the tests involve newer technologies such as bandwidth extension or parametric multi-channel coding.

some useful things, like sending a signal to each earbud individually (currently Bluetooth goes to one earbud and has to be rebroadcast to the other). You may also be able to play to two or more pairs of headphones at once, and to select an 'Auracast' stream from, say, multiple monitors in an airport or a gym.

But as the 'LE' indicates, the priority is low energy use — as it always has been for Bluetooth, where the bulk of applications are for things other than audio, where range and power consumption are more important than higher bit rates for audio quality. And sure enough, the maximum bit rate allocated to audio under LE is lower than for existing Bluetooth.

Other things being equal, lower audio bit rates mean lower audio quality; that's hardly rocket science. But with the various announcements came rather chirpy news about a new codec, LC3, which is to be the 'mandated' codec inside Bluetooth LE, just as the SBC codec long has been within Bluetooth Classic.

In that earlier article, I made a slightly offhand comment about the new LC3 codec coming from Fraunhofer, "the makers of MP3", but I also noted that they had a higher-level codec, 'LC3plus', which seemed not intended for Bluetooth, partly because it had been granted the Japanese Audio Society's logo for Hi Res Audio Wireless. And regular readers will know that we regularly point out that high-res audio cannot pass through a Bluetooth pipe, because the pipe is just too small for the bit rates required for lossless high-res.

Fraunhofer dropped me a line, very polite, noting that LC3plus was, in fact, now being used for Bluetooth (this had developed since the earlier literature I had read), and indeed Fraunhofer's LC3plus had been partly developed specifically to minimise THD+N for its high-res audio customers. Would I like to chat?

Of course. And a long chat, it turned out, with Alexander Tschekalinskij (Alex), Fraunhofer's Senior Engineer in Audio for Communications, and Alfonso Carrera, owner/CEO of Naradiss Media Technologies in Spain and a Senior Consultant at Fraunhofer. They later turned up in Sydney at a Bluetooth event, so I got to meet them, but this interview was conducted internationally over Team Viewer in Q3 2023.

76 research institutes

Even if you haven't heard of Fraunhofer, I can pretty much guarantee that some of its technologies are in your home, and almost certainly in your phone. Fraunhofer-Gesellschaft, headquartered in Germany, claims to be the world's leading applied research organisation, with 76 institutes and research units around Germany, the largest of which is the Fraunhofer Institute for Integrated Circuits IIS in Erlangen. This is home to the audio and media technology research in which we're interested, including the development of MP3 and AAC.

We talked so long that I originally intended to excerpt only a section or two as an interview, in particular the discussion around what constitutes high-res audio. But Fraunhofer was clearly barely interested in high-res and far more keen to explain how LC3 (but actually LC3plus, it turns out) might be better than I had implied. And that turned out to be interesting too, if with sufficient acroynms and initialisms to require the glossary included here, as well as knocking on the ceiling of my relatively minimal electronic engineering education (B.Sc. Hons. Nottingham 1985, but only a 2.2).

So to cover both ends of the topics required, let's instead go through the conversation in more length, with most of what Alex and Alfonso said, transcribed and edited only for clarity, or to avoid repetition, and to strip out some detail on, for example, hearing-aid profiles and other areas too far outside our hi-fi focus. The presentation part of their talk included more slides than Wet'n'Wild — we've rejigged only a few of the more useful charts here, but detailed literature on LC3plus is available online if you need more.

If you do glaze over on the technical stuff early on, move forward, as it gets interesting. They were nice guys, keen to get the facts out, and happy to help. Here's the conversation.

a new codec

ALEXANDER TSCHEKALINSKIJ (ALEX): I think it makes sense to give you an intro — how did we develop LC3? How did we develop LC3plus from that? *Why* did we develop LC3plus? Where is it standardised and where is it used, etc? And then we can also answer the questions that you sent that were mostly related, I guess, to the bit rate and to the high-res logo from the Japanese Audio Society. These were the main things?

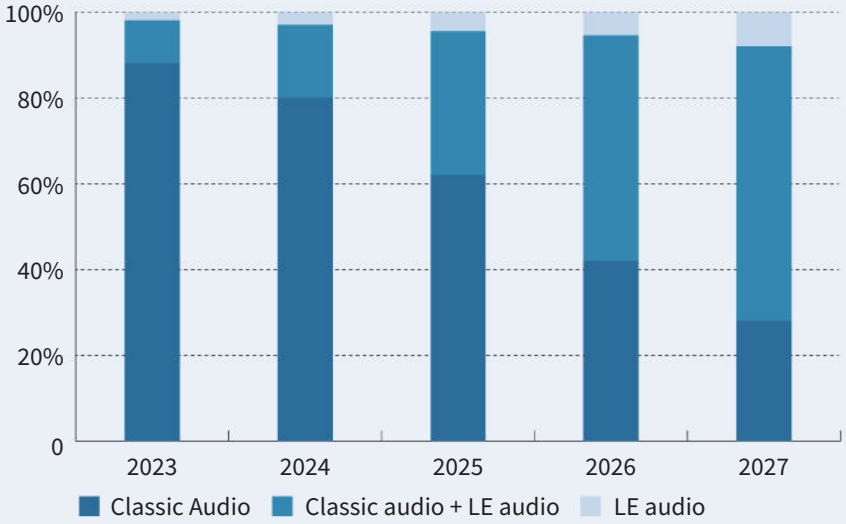
JEZ: *Yes that's sort of where we came from, but you never know where it'll go. So go ahead.*
ALEX: Exactly. So, LC3 for Bluetooth — we started our work, I think, sometime in 2016. This was when the Bluetooth SIG* started looking for a new audio codec. So the Bluetooth Hearing Aid Group at that time made an official call that they are looking for a new audio codec. Fraunhofer and Ericsson replied to this call and said OK, we are going to develop a new Bluetooth codec for you. So basically this is how LC3 development started.

JEZ: *OK I've got a question already — so the Bluetooth SIG wants a new Bluetooth codec. What — there's nothing suitable out there? They couldn't*

Alexander Tschekalinskij (left), Fraunhofer's Senior Engineer in Audio for Communications, and Alfonso Carrera, owner/CEO of Naradiss Media Technologies in Spain and a Senior Consultant at Fraunhofer.

Bluetooth LE Audio

Prediction of devices on the market using LE audio



Source: Bluetooth SIG

LC3 was originally commissioned as a codec for hearing-aid use, but has been adopted for wider Bluetooth use under Bluetooth LE, which is anticipated to be included in 70%+ of all Bluetooth devices by 2027.

have adopted LDAC, which has been made open source anyway? Why do they need a new one?
ALEX: Well they were looking for a codec that is basically royalty-free, right? Because they do not want their members to pay royalties for a codec. They were looking for a codec that fits — I mean, at that time they were looking for a codec that fits mostly the hearing aid use cases. I guess if you're referring to LDAC — LDAC is a high-resolution audio codec for music streaming from Sony, and this is, I guess, a bit too much for a hearing aid. Basically they were looking for a codec that is more efficient than the old SBC codec, that provides basically better audio quality at lower bit rate. They also had a few requirements regarding delay, regarding computational complexity. But they were basically looking for a new codec that is, let's say, free of charge and better than SBC.

JEZ: *So how does Fraunhofer make money out of that, then? You just sell them the codec as a one-off thing? You don't get licensing onward?*
ALEX: We'll get to that in a few minutes if you don't mind waiting to answer this question.

LC3 is 'mandated', so it's free to use within the parameters of Bluetooth LE. But then how does Fraunhofer make money out of that?

LC3 adopted

JEZ: *Sure, go on.*
ALEX: So basically Fraunhofer and Ericsson replied to this call for a codec. We supplied the Bluetooth SIG with, you know, early versions of the codec, et cetera, and then eventually the Bluetooth hearing aid guys said, okay, we are going to use this codec as the mandatory one.

At that time it also became clear that LC3 is not a codec that makes sense for hearing aid use cases only, but also for use cases outside of that — like music streaming and telephony. That's why LC3 was also evaluated in the so-called Audio, Telephony, and Automotive Group in Bluetooth, and there also LC3 reached mandatory status.

But we thought it would also make sense to include LC3 into the Bluetooth Classic handsfree profile. So if you are having your mobile phone call in your car, you are normally using this hands-free profile to connect to your car hands-free device. It supports only SBC with a wideband quality, and basically we now added LC3 to support also super wideband quality there and replace the old SBC codec.

So you already asked the right question. How do we make money with LC3? With LC3 the money-making is a bit limited. The reason for that is the Bluetooth PCLA* [see Glossary], that's a Bluetooth Copyright Licence Agreement. Basically if you contribute something to Bluetooth, if you contribute a spec like Fraunhofer and Ericsson did with the LC3 specification to the Bluetooth SIG, we're basically giving away certain patent rights that are related to the spec. We are giving them away to all Bluetooth members according to this Bluetooth PCLA.

So it means that all members can actually use the LC3 codec free of charge, given that the codec is specified in the Bluetooth profile. If company A is using a Bluetooth profile where LC3 is specified, they basically can use LC3 free of charge.

So that ensures that all devices out there that are now going to have any audio, they don't have to pay for an LC3 licence. Companies can get the software from us. They can implement it by themselves — like a lot of companies do — but there is no licence fee involved there.

JEZ: *And that's just for LC3, not for LC3plus, or both?*
ALEX: That is correct.
ALFONSO CARERRA: That is LC3.

JEZ: *So you give away LC3 and you make your money on LC3plus?*
ALFONSO: Er, yes — maybe just to complement that, it's also important to point out that any use of LC3 *outside* that definition is royalty-bearing, the same way LC3plus is. And there are cases like that. And there is confusion, actually, in the market sometimes, that you need to clarify about. So this is a very important point. You don't have to pay for the patents *only* when the PCLA covers it. Any use of LC3 *outside* — like, let's say, an earbud that uses a proprietary RF or low-delay connection and uses LC3, and this is not a Bluetooth link, just to give an example, this is a royalty-bearing implementation — it's not covered by the PCLA and they need to pay patents on LC3.

JEZ: *Gotcha. Is the PCLA limited to Bluetooth LE, or does it cover Bluetooth Classic?*
ALEX: It's both. It's independent of LE or Classic. Like Alfons said, all usages outside of this PCLA usage will be royalty-bearing, and basically for that we suggest — hey, if you're already paying royalties, you should actually use LC3plus and not LC3. So LC3plus is basically the codec of choice for all the use cases that are not covered by this Bluetooth PCLA, or that require features beyond the ones that LC3 Bluetooth has.

LC3plus

The development of LC3plus started kind of in parallel to what we did for LC3 in Bluetooth. At that time, we worked with a pretty prominent tech company who requested a couple of LC3plus features, and that is actually the main reason why LC3plus is an ETSI [European Telecommunications Standards Institute] DECT standard. Our first, let's say, intention was that this is going to be a DECT codec. However, it turned out that currently, I guess, most usage is actually outside of the DECT world for LC3plus.

The LC3plus standard in ETSI is an open standard, so there is a spec and a software part of the standard. So you can download the LC3plus software free of charge, fixed point and floating point. There is no software for LC3, there is only the spec in Bluetooth, but there is no software available. For LC3plus you can take the software, you can implement it — you don't necessarily have to buy it from Fraunhofer.

So LC3plus in DECT appears as part of two profiles. One is the extended wideband speech services, so there we increase wideband to super-wideband audio quality. And also in the advanced audio profile in DECT, where we use LC3plus high-resolution to transmit up to 96kHz and 24-bit audio.

Basically in DECT there are no real operation points defined that you mandatorily would have to use — you can use the LC3plus codec as you like. That's why it basically connects almost all wireless audio devices that you can imagine that could have DECT — smart speakers, gaming headsets, wireless microphones, all that stuff.

One very important point is that LC3plus is not tied specifically to DECT, or to any DECT profile. You can use LC3plus in Bluetooth, Wi-Fi, WiSA, Ultra WideBand — any other wireless or non-wireless transmission technology you might think of. It is not tied to any of them; it's simply an ETSI DECT standard, but this doesn't mean anything.

There's also no qualification involved in LC3plus, like in LC3. You have to qualify LC3, you have to prove to the Bluetooth SIG that, hey, I have an LC3 implementation that works well, that is conforming to the one that Fraunhofer and Ericsson standardised. For LC3plus there's no such thing. You can take the codec, you can download the software, use it in any wireless or non-wireless RF you like.

ALFONSO: To add to this — this is actually an important message, because sometimes Fraunhofer makes an effort to explain that although this is a DECT standard, you can actually also use this as a vendor-specific codec in Bluetooth. So yeah, it's not a 'Bluetooth codec', but you can use it in Bluetooth. That's usually our main message.

On the other hand, you sometimes also get the impression that maybe because of the naming, because they see that LC3 is a Bluetooth codec, many companies assume that LC3plus is also a Bluetooth codec. Sometimes they are surprised that this can actually be used outside Bluetooth. So this is also an important message.

JEZ: *Yeh — actually I came from the other direction myself because the first time I looked at your site, at the difference between the two, it didn't say much about Bluetooth at all for LC3plus, it was all DECT, which is why I thought it was a different type of codec. And then at some point you decided or you realised that Bluetooth was a good avenue to follow.*

ALEX: Yeah, that was our main intention, LC3plus should be a DECT codec, that's why we standardised it there. But actually it turns out that LC3plus is used quite a lot in the Bluetooth environment and outside DECT in general, and that's why we created this 'LC3plus high-res' Bluetooth A2DP specification.

LC3plus high-res

So in Bluetooth, there are three types of codecs, right? There are the mandatory codecs, like LC3 for LE audio, or SBC for Classic. You cannot avoid them; you have to support them if you support these profiles. Then there are so-called optional codecs, optional for the OEM to implement, to support, to use. Optional codecs are, however, part of the Bluetooth profile, like AAC in A2DP. It's not that the AAC codec is specified in A2DP, but the A2DP spec specifies the transport and negotiation for the codec so that there is an interoperable way of using it.

And I guess the largest group of Bluetooth audio codecs are the so-called vendor-specific codecs, like LDAC, aptX, LHDC, so the codecs where you must get the spec from the codec company. So the codec company tells you — OK this is the way I want to negotiate and transport the codec. It's basically the same as the optional codecs, just not part of any Bluetooth spec, but still optional to support. You have to follow a certain spec for the transport, but it is not specified in the Bluetooth spec itself.

This is the way that we decided to go with LC3plus for Bluetooth A2DP. We had quite some customers who wanted to use LC3plus over Bluetooth A2DP, so we had to come up with a way of making it kind of interoperable. That's why our Fraunhofer webpage now, since I guess almost two years ago, features this document that basically tells you how to specify, how to transport LC3plus over Bluetooth A2DP using this Fraunhofer company ID. There is a first, actually, an open-source implementer, which is the BlueZ-ALSA open-source project that implements the Bluetooth stack for Linux, and they added support for LC3plus high resolution as a single-source support in this project. But to people who really want to test this out we also provide patches for Android phones; they can flash these patches on an Android phone to enable LC3plus high-res on the Android phone as a source or sink device.

For LE audio we are working on something similar… it takes a bit of time because LE audio is just rolling out and right now there are no mandatory specific codecs available in LE audio, and also the path of specifying these mandatory specific codecs is not fully clear right now, that's why there is not any audio solution out there yet. But there surely will be, and it will be similar to the one we have now for Bluetooth A2DP.

JEZ: *Cool. So can I just clarify — the LC3 codec, the lower version, is mandatory in Bluetooth LE, is it also now mandatory in Bluetooth Classic? No.*

LC3plus initially began life as a codec for DECT (Digital Enhanced Cordless Telecommunications), a standard used for creating cordless telephone systems and for IoT systems.

But there is nothing that ties LC3plus to DECT, and its ability to reach 24-bit/96kHz transmission makes it suitable for use with music via Bluetooth LE, Classic Bluetooth, and beyond, as a third-party vendor-specific codec.

ALEX: No, it's only mandatory in Bluetooth LE. For Bluetooth Classic it's only SBC that is mandatory.

OK, so regarding LC3plus *[see table below]*. It's a codec jointly developed by Fraunhofer and Ericsson. It's an open-standard codec, which is very important to us because we wanted our customers to not be limited to any kind of hardware or chipset vendors, or even business relationships. Like if you want to get aptX, you need to get it straight from Qualcomm, there is simply no way around it. If you want to get LC3plus, go to Cadence, go to NXP, go to somebody else, they will all give you chips with LC3plus, so there is no limitation on hardware or chipset vendors.

LC3 vs LC3plus

The main three features: the first is the reduced latency. LC3 in Bluetooth has two frame durations: the one is 10ms, the second one is 7.5ms — the 7.5ms was added at a later point due to Bluetooth Classic backwards-compatibility reasons.

	LC3	LC3plus
Standards	Bluetooth SIG	ETSI
Software Availability	Fraunhofer	FraunhoferETSI
Frame Durations	10 ms 7.5 ms	10 ms 5 ms 2.5 ms
Advanced Packet Loss Concealment	×	✓
Forward Error Correction	×	✓
High Resolution Mode	×	✓
Available for Bluetooth A2DP	×	✓
Available for Bluetooth LE Audio	✓	✓

Source: Fraunhofer IIS

LC3plus in DECT has two additional frame sizes, which are 5ms and 2.5ms. So basically we can reduce the codec delay by roughly 60% compared to Bluetooth and compared to LC3 in Bluetooth LE audio.

The other feature is the improved transmission range and improved robustness due to two things: the higher compression ratio compared to other solutions, and the Advanced Packet Loss Concealment and the error protection that is available.

So the advanced concealment can conceal frame losses to almost inaudible, and the error protection is an additional layer of data that you encode to correct bit errors. That is mostly needed for the DECT.

And last but not least we have the high resolution, which I guess was the feature that we developed last for LC3plus. We got requests from certain customers that they wanted to have a dedicated mode that can transmit higher sample rates up to 96kHz, higher bit depths, and they were very keen on the so-called total harmonic distortion performance. So this was their main metric — not audio quality really, but they were very keen on delivering high THD+N. So this is how we tried to tune LC3plus, to achieve this nice THD+N.

So summarising all these LC3plus features — it's an ETSI standard rather than LC3's Bluetooth standard, reference code available, two additional frame sizes, and high resolution mode.

Key advantages of LC3plus over LC3 include improved latency, error protection, and high resolution. Where these are key to a developer's goals it will make sense to pay Fraunhofoer to license the LC3plus codec instead of using the mandated and free LC3.

JEZ: *Just a quick question. On the packet size, in order to reduce latency, there's presumably some sort of trade-off in having lower latency versus higher latency? What are you losing for that — is it throughput? Because you've got more packet definitions now? What do you lose by having low latency?*

ALEX: So if you reduce the coded frame size, you normally need to compensate by increasing the bit rate. In Bluetooth, the thing is that Bluetooth has an ISO interval, which is like the smallest interval you can send packets in. And this interval is 5 milliseconds. So for Bluetooth, the benefit of going to a coded frame size below 5 milliseconds is not that high. Basically to make this Bluetooth ISO interval, the perfect frame size would be the LC3plus 5 milliseconds.

But you don't lose anything by going to the small ISO interval. I mean, you just need to send a little bit more bits because you have to compensate for the higher bit rate.

JEZ: *Yes. So for a fixed bit rate, you'd have to reduce the useful data a bit.*

ALEX: Yeah, exactly. You basically have to compensate for higher bit rate to stay on the same quality level.

So let's look at the total harmonic distortion. THD is a measure that tells you, OK, this certain codec distorts a certain frequency by this much. There's a measurement or a plot that shows the THD+N at a tone frequency of 1kHz. The main reason why we do this at 1kHz is because the other codecs like aptX and LDAC, they only publish information at 1kHz, they don't publish the full spectrum — though we also have a full spectrum measurement for LC3plus.

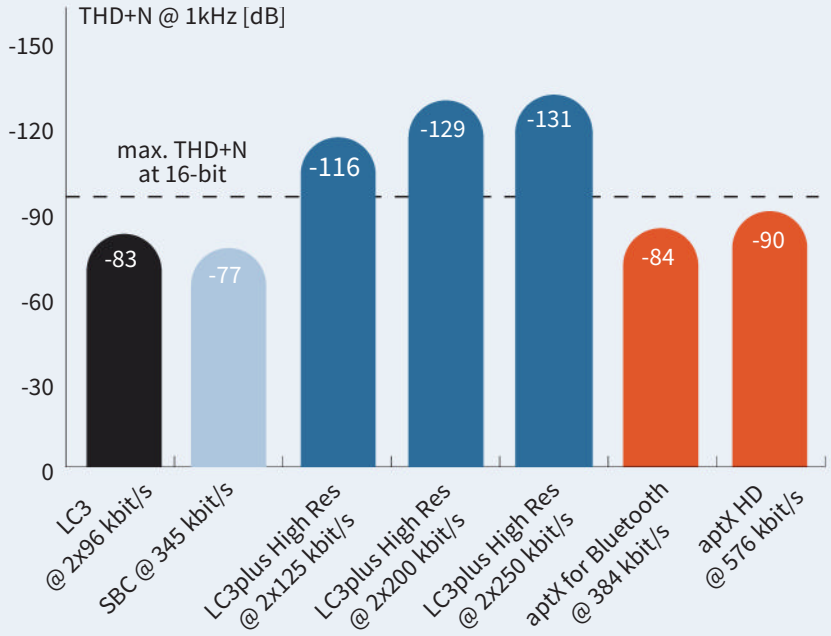
THD+N

Well, I guess if we look at the first two bars, which are LC3 and SBC *[see chart above right]*, this is a quite normal result — we see that both codecs perform quite close to the 16-bit threshold. This is what we expect because LC3 internally has a 16-bit precision. So you can actually input 24-bit or 32-bit data into LC3, but the internal quantizer precision of LC3 is kind of limited to 16-bit by the certification. So you cannot really achieve a good THD+N beyond the 16-bit threshold.

For LC3plus, you can see that we can achieve up to -131dB of THD+N at the bit rate of 250kbps per channel. This is like our sweet spot, because beyond that bit rate, there is only a very minor increase of the THD+N performance. So you can go up with LC3plus to 500kbps, but the THD+N will be maybe -132dB or 133dB, so there is no significant increase beyond 250kbps per channel.

Well, what you can see from this is also that LC3plus requires only around one-third of the bit rate to perform similar to LDAC [*the LDAC bars were removed from the chart at the request of Fraunhofer's marketing teams, but are mentioned here and in the chart's notes*]. So LDAC's -116dB requires 990kbps for a stereo configuration, and LC3plus requires 2×125kbps, which is 250kbps per channel. And I guess it's fair to say that LC3plus somehow offers the best THD+N performance among all these codecs.

And this is what our customers were very keen on. So we had a few customers from the high-res area, and they were very keen on achieving a very nice THD+N.



This chart from Fraunhofer shows the THD+N distortion levels of various codecs measured at 1kHz. As originally shown to us there were also figures for LHDC 4.0 (-97dB, right on the 16-bit line) and for Sony's LDAC at 330kbps (-38dB) and 990kbps (-116dB). We were asked not to show these columns for some reason, but since Alex mentioned them in our conversation, we can hardly not include the relevant numbers.

We understand that the reason for that is because if you have a certain hardware, like your THD+N of the hardware is defined by the hardware, right? You can have a certain hardware quality which defines the total harmonic distortion of your hardware, of your loudspeaker.

JEZ: *Depends how you measure it, but yeah that's right.*
ALEX: So, if, if your codec limits that to, let's say, -90dB as aptX High Definition does, then, well, what's the sense in using -130dB hardware in your device if your codec's limiting it all to -90dB?

So we understand that this is the main motivation to not limit the overall THD+N by the audio quality.

JEZ: *So can I ask a question — is this something you've come across before, defining audio quality by THD+N? I mean, I know it comes into it and I know it's a measurement we put on amplifiers, but it's not something I've come across before where people have actually just said I'm judging audio quality entirely by THD+N, which seems to be what you're saying.*

Also, if that's the case, how come it doesn't get any better above 250kbps or even above 500kbps? You're surely not saying there's no quality difference between going to full uncompressed HD and 500kbps if the THD+N is the same? So THD+N can't be the total arbiter of sound quality — because you are saying you can't increase it by using a higher bit rate.
ALEX: Yeah, so we did not really come up with this measurement. I mean, this was really requested by our customers. This was also very new to us. So that's the first time I started using this audio precision device that actually can measure THD+N in a live measurement.

JEZ: *But you're now using it to promote LC3plus.*
ALEX: Well I think there are, as you say, better metrics that can quantify the audio performance increase better for higher bit rates. So the THD+N will somehow come to a threshold where it will not get any better. And I assume this is somehow related to the measurement because, I mean, if you use a higher bit rate, you can fully encode a spectrum. What you do in the end is you use the residual bits to somehow add the missing information, but I believe this is not what the THD+N measurement is looking for. So there are other metrics, like I believe one of them is the so-called noise-to-mask ratio, I'm not 100% certain, which can actually provide a better quantification at the very high bit rates, how your audio quality basically increases; this is more like a metric that is related to the so called PEAQ* tool that can give you a grade on your audio quality file.

JEZ: *Because it's an interesting point, if we're saying — if you guys rather — are defining LC3plus as being better because of its THD+N, but then you say 'you can't get better than 500kbps, can't be done, doesn't make it any better', that's clearly a strange argument.*
ALEX: Um, well, I don't think that this measurement can not get any better. I'm pretty sure that it can. One thing that we noticed that I'm aware of is that when we measured the THD+N of the regular sound card, without actually introducing any codec into it, we achieved a THD+N of around -140dB. So it's basically not infinite, it's somehow limited also by the sound card that you have. And I guess this is also when the limiting factor will come: you have a certain hardware that you use for this measurement. Yeah. We had an RME Babyface sound card, I think.

JEZ: *For sure. You might be knocking on the ceiling of the equipment.*
ALEX: Exactly. I guess the other thing regarding high resolution, one request that our customers made was that they are seeing, let's say, packet collisions basically, in environments with a reduced bandwidth or high interference, like crowded public transport.

Fallback bit-rates

This was mostly requested from our Chinese customers, that they are seeing a lot of packet collisions for the people that are listening to audio with their smartphone earbuds in, let's say, a subway.

So that's why we added also so-called fallback bitrates to LC3plus that allow you to keep your connection so that you don't have that many audio dropouts, or not any at all. And it still provides a certain nice audio quality level.

JEZ: *I totally see the advantage of that, and obviously LDAC does that, down to 660 and 330kbps. One problem with this system is when there's no way to tell that LDAC is doing that — you may think you're listening to 990kbps, but because you're in a bad environment, it's actually transmitting shit. So is there some way with LC3plus — like a little red light will come on and go, 'warning, bad Wi-Fi environment'? Or will you think you're getting high-res transmission when you're not? That's my worry.*
ALEX: Yeah, so, I guess I can put your mind at ease. So, I mean, our regular service operation that we recommend to our customers is you should use LC3plus between 96 and 500kbps per channel. With this bit rate, you can achieve an excellent audio quality which is close to transparency. However, we also allow

LC3plus will have fallback rates for poor transmission environments, in a similar manner to LDAC's three levels of transmission.

LC3plus's advantage in this comparison, says Fraunhofer, is that its sound quality is preferable to such rivals at lower bit rates.

this fallback operation down to 64kbps. And, I guess it's fair to say, I mean, Alfonso is showing all our demos to our customers that the trade shows. In our demo, we have, like, different items coded at 125kbps, 250, 500, and also at 64. And, Alfonso, correct me if I'm wrong, but I guess the customers are not able to distinguish between 64 and 500? In terms of audio quality?

Listening trials

ALFONSO: Yeah, I mean, let's be fair with this high-res story. As an extension of this, this is marketing, basically, and if we go to real experience of listeners, they cannot even tell, as Alex says, even our fallback operation at 64kbps from uncompressed. No one. I mean, 100%, it is impossible for them to tell apart.

JEZ: *What are you playing it on?*
ALONSO: It's classical music, some jazz...

JEZ: *Not the material; what are they listening on, headphones? How are you demonstrating?*
ALEX: It's a wired amplifier and wired headphones with, um, noise cancelling. We got some Sony wired headphones with noise cancelling, I can't tell you the model, but yeah.

JEZ: *I'm just saying those demonstrations are often limited by the equipment you listen on, you know.*
ALEX: Yeah, of course. Yeah, I mean, if you're interested, we can send you the link for some seamless bit-rate switching, you know, where you can basically switch between you go from 500, you go down to 50, 125, 64, and then you go up again, and actually you don't really hear much.

JEZ: *I'd love those, yeah. Send me those.*
ALFONSO: But maybe just to follow this point, the original question, what happens with LC3plus if you compare to the use case he was pointing to... that it is shit if it has to pull back to their 330kbps or something. So actually one of the main strengths of LC3plus — believe me or not, you can experience yourself if you can really tell this apart, but no one tells it apart — the main point of LC3plus regarding the high-res, apart from all kind of fancy total harmonic distortion and noise-floor comparisons you can make, is that it makes sense in real life.

And this goes beyond the total harmonic distortion charts. This is the ability to actually operate real high-resolution content in bit rates that make sense in real life. And not having that kind of abrupt experience you have with LDAC, and being able to downscale your bit rate to harsh environments in terms of interference, and still provide high-resolution content you basically cannot tell apart from uncoded content. That is, I would say, the non-scientific pitch I would give you in this regard.

JEZ: *That's lovely. OK so you're saying 96kbps, down to 96kbps, you're calling transparent compared to the original file of CD quality or higher?*
ALEX: So, we define transparency as, I believe, 0.1 ODG difference compared to the original item.

JEZ: *So I don't know what ODG difference is, sorry, what's ODG?*
ALEX: Sorry, so the ODG is the so-called Objective Difference Grade. This is, like, if you do a listening test, and you let, um, naive people [chuckles] compare different audio items, you know, their rating would normally scale from zero to five, five being the best, zero being the worst. And you normally give them a reference file and a coded file, so if the coded file is sounding very well they will not be able to tell which one is the reference file any more.

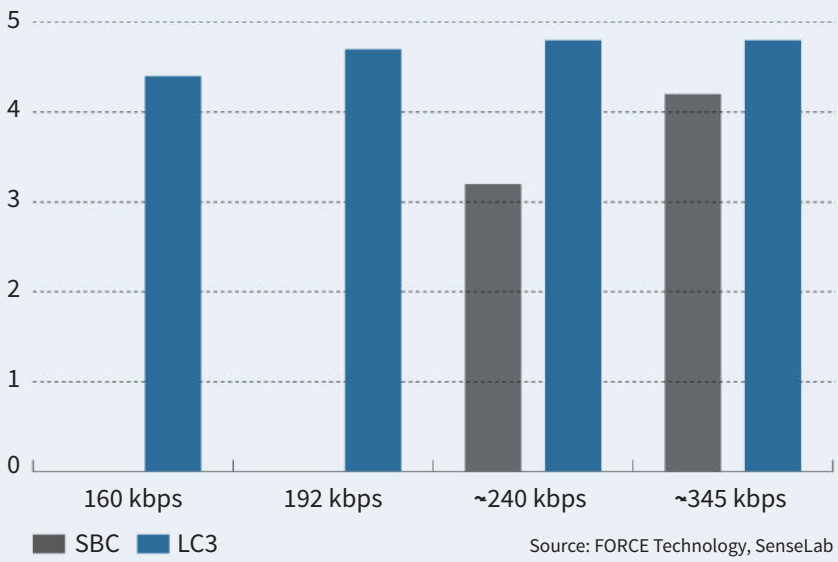
JEZ: *Cool, and so with 0.1 'ODG' variance, you'll call that transparency.*
ALEX: Exactly, when we reach this stage we call it transparency. And I don't think it's exactly 96kbps, a little bit higher, I can give you the exact number.

JEZ: *I would love the exact number, and I'll tell you why, because Sony said to me once, Sony's Japanese engineers said to me once, they can't hear the difference between 248kbps upscaled through a DSEE engine, and high-resolution audio. They literally couldn't see or measure a difference. And my next question to them was, well then why do we need any high-res audio files anywhere, ever? Because if 96k, 248k has the same information in it, according to you guys, why do we bother with any high-res audio? Let's just throw it all away.*
ALEX: Right. Yeah, I mean, this is more an objective measurement, so you really invite people and let them listen to the audio files, this is how you measure it objectively, but, as Alfonso mentioned, there is a lot of marketing going on, especially for lossless and total harmonic distortion, it's, uh, it's not all purely technical, it's, uh...

JEZ: *But it is technical if you're — well, you're combining objective and subjective, you're saying that a 96kbps or slightly higher file is... 99% transparent with…*

Bluetooth Codec Comparison

Standard Stereo Listening Test



Source: FORCE Technology, SenseLab

you haven't said yet, whether that's with CD or higher quality. Do you mean high-res or do you mean CD?
ALEX: So the test that we did, we did both tests for 48kHz and for 96kHz, and for 96kHz the bit rate you need is a bit higher where you get it, where you reach that transparency.

High-res hype

JEZ: *So how do you reply to the question of, well, then why do we need high-res files? What's the point in having any?*
ALEX: I mean, we need high-res because of the markets, because the market wants to have it.

JEZ: *But you guys clearly don't believe it has any benefit.*
[Pause.]
ALEX: Yeah, um…

JEZ: *So we're working on high-res codecs and we don't believe in high-res? It's a bit absurd. It's just market-driven nonsense then?*
[Pause again. Laughter.]
JEZ: *Just saying...*
ALFONSO: Yeah, I mean, but actually the main hype is not high-res, it's lossless, which is a step further into this, let's say, need for quality that, uh, real people in real life will not tell apart, yes? But it is mostly a marketing-driven activity, 100%. I mean, telling you something otherwise would be lying, and I don't…

JEZ: *No, no, I totally appreciate it. It's just like, you know, it's mind boggling when you consider what the market does, isn't it? You know, and the money people spend on it…*
ALFONSO: Yes. And look what Apple with lossless audio and all these kinds of services in the lossless realm, that is also pure marketing. What we at least — in this let's say 'nonsense', as you say, to which I fully agree, to some extent — I think one of the strengths, and that's why I was a bit, you know, pushy on this argument, is that.. it may be a bit weird to put it this way, coming from a scientific research centre like Fraunhofer, but if we have to do this high-res and even go for lossless, at least we are trying to make this in a way that we provide in terms of the compression metrics, like this total harmonic distortion noise floor, are better than the competition's solution, which is mostly, let's say, a scientific and a chart comparison situation.

But if we have to use this, let's use it in a way that makes sense in real life, where you are actually not destroying the quality of experience. As you very well pointed out before, what's the sense of having… my goal is not to attack LDAC directly, but if you take this as an example, what's the sense of having a high-res codec that in real life, the quality of experience may be very bad because you cannot sustain a bit rate that is necessary to transport this high-resolution audio content? So at least our strength, and I really insist on this, is that if we have to do this high res, we have a best-in-class performance in terms of those metrics, but what is *more* important to me is actually that if you are going to use this high-resolution codec, your quality of experience overall is going to be excellent, because we can downscale this to bit rates that can operate in very, very demanding RF challenge situations, and you are not going to experience any packet loss.

And even we have, on top of this, advanced PLC technology that even if there is some packet loss going on, we can conceal this super-efficiently — another very important feature in real life that really accounts for a much better quality of experience for the end user. And now I shut up on this.

JEZ: *No, don't please, that's fantastic, it explains the point of what you're doing very well.*
ALFONSO: So there are different parameters going on here. Jez, I fully agree that this is mostly a marketing situation. And there we have a very good answer in terms of the charts: we are better than the competition. But I stress even more the fact that we can provide this in situations where other codecs really destroy the experience because they cannot, you know, provide that high-res performance at such low bit rates.

JEZ: *Yeah. And so, say again, what do you think is the bit rate you need to work at in order to avoid any, uh, bad Wi-Fi environments, Bluetooth environments, et cetera. 96kbps is a safe level?*
ALEX: We can go down to 64kbps. This is the smallest bit rate that we allow, yeah, for this high-resolution operation. I mean, whether or not you can really avoid all collisions at this bit rate, I can't tell you…

JEZ: *But like you say, you've got corrective software.*
ALFONSO: Maybe Alex, we can point out the fact that, you know, collaborating very closely with a Chinese big smartphone manufacturer, they know about these things better than we do, and they really gave us some reference, right? And they basically said 256kbps total is kind of like the limit for them — beyond this bit rate, there would be some packet loss going on in, let's say, congested network situations. So, if we could really provide high-resolution audio below this bit rate, that was one of the key elements why they are integrating LC3plus high resolution.

JEZ: *That's really good information, and that explains why the listening tests went up to 248k, presumably.*
ALFONSO: That is right.

JEZ: *Excellent. That makes a whole lot of sense. Alright. Where are we going? You had a graph coming up.*
ALEX: Thanks Alfonso for the explanations. Yes, so the other feature is the advanced concealment for packet losses. So both LC3 and LC3plus have concealment for packet losses. In LC3 it is very simple: it basically takes the last frame, repeats it, and applies some fade out. So if you have a packet loss, you just take the last received frame data and you apply a small fade out.

The LC3plus advanced concealment is far more efficient, far more complex, so to say. It has basic algorithms to conceal speech losses and music packet losses. *[See the two charts overleaf: the first is for speech signals, while the second chart is for music signals.]*

And so what you see here is that we have true listening tests — the left one is for speech, the right one is for music — both carried out with, um, naive listeners that we invite and let listen to audio items where packet losses were applied.

"The main hype is not high-res, it's lossless, which is a step further into this, let's say, need for quality that, uh, real people in real life will not tell apart, yes? But it is mostly a marketing-driven activity, 100%."

256kbps can be considered a maximum bit rate for Bluetooth when considering a busy wireless environment, say Fraunhofer's clients.

Packet losses represent lost data, and different codecs provide different methods for correcting or concealing those losses. Fraunhofer claims LC3plus to be particularly effective in this regard.

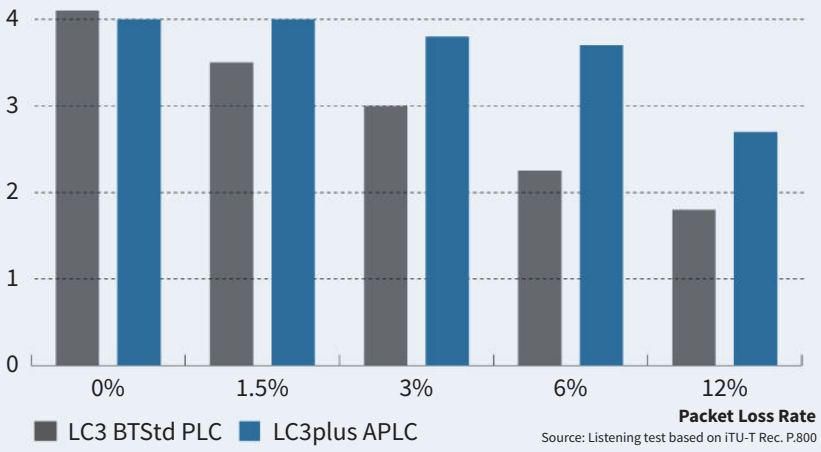
Error correction and packet concealment are dense topics! But this is the stuff that prevents glitches or distortion spoiling your listening pleasure, especially in busy wireless environments. If it's too technical, jump ahead to around the LC3plus logo opposite.

Packet losses

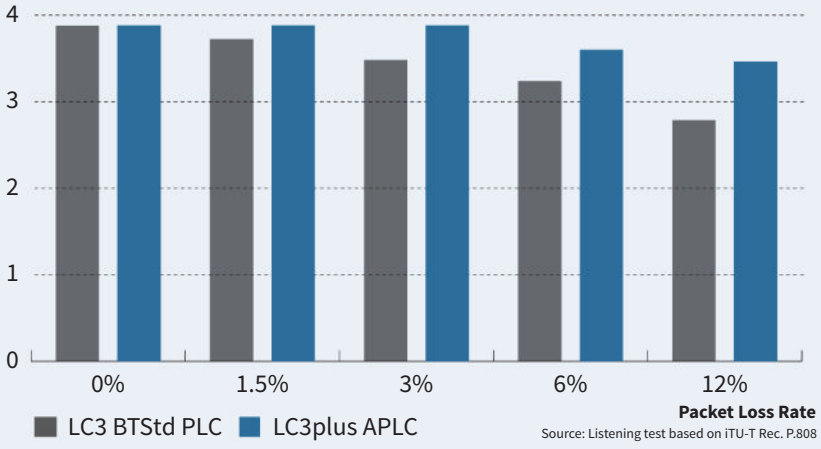
So you see here (below) the packet loss rate on the X axis, and the score on the Y axis, with brown colour for LC3 with the Bluetooth Standard PLC, and blue for the LC3plus, with the advanced concealment.

I guess it's fair to say that the advanced concealment performs significantly and much, much better than the regular concealment. Interestingly, the difference for music is a bit smaller than the one for speech, yeah? But as you can see, LC3plus can conceal for both speech and music signals, and actually for speech up to a packet loss rate of 1.5% and for music up to a packet loss rate of around 3%, we can actually conceal the packet losses to be almost inaudible, so the audio quality level stays almost the same compared to the 0% reference condition. I think this is something that is best to actually listen to in real life, so we can give you access to our demo if you like. And you can listen to the items, to the coded items, and actually evaluate basic concealment compared to the LC3plus advanced concealment, listen to the audio files, and uh, make your own opinion.

LC3/LC3plus PLC Technologies Comparison
LC3 Standard PLC and LC3plus APLC for Speech



LC3/LC3plus PLC Technologies Comparison
LC3 Standard PLC and LC3plus APLC for Music



With LC3 the Standard Packet Loss Correction is audible with only 1.5% packet loss. The APLC of LC3plus allows up to 1.5% loss for speech and 3% loss for music with no reduction in listener scores (left axis).

JEZ: *Yeah, that's fine. Is there a trade-off for APLC?*
ALEX: No, so the APLC basically replaces the regular decoding on the decoder side. So basically you either decode normally, or you apply the PLC. These are mostly the same in terms of complexity as well, so there's no trade-off there.

And I think the Advanced Concealment is probably the most requested feature for LC3plus that we receive, because people basically want to enhance their regular LC3 with the advanced concealment — that's why they choose to use LC3plus instead of LC3.

That really makes sense for, say, Bluetooth phone calls, whether it's hands-free profile or the telephony profile. You want to enhance your phone calls, you want to enhance your music streaming for packet losses — and that's how we do it.

The other part of the robustness features of LC3plus — and this is now more a feature that is related to DECT — is the FEC, the Forward Error Correction. So basically what we do is we add an additional layer of encoded data to the bitstream, so reducing the codec net bit rate, but using some of the bit rate to add additional protection data, then you can try to correct any bit errors with the LC3plus FEC. In Bluetooth when it receives a packet, it determines whether the packet was received correctly or not. If not, it will try to resend the packet, but it will not try to apply any FEC correction mechanisms on the packet. So the forward error correction can be used in DECT, but it's not really meant to be used in Bluetooth.

JEZ: *Yeah, okay. [Possibly drifting at this point.]*
ALEX: So for the DECT use case, this error correction and the Advanced Packet Loss Concealment are basically tied together. So if your error correction mechanism determines that you have too many bit errors and you cannot correct them, you can still try to conceal the frame with the advanced PLC. So not all is lost if you have too many bit errors, it's like two parts that are working together.

JEZ: *I did Hanning codes at college, this is taking me back to that. I haven't done any of this for 30 years.*
ALEX: Yeah. And the last feature is the low delay and the latency. And basically there are two reasons why LC3plus can reduce the end-to-end latency in Bluetooth in the audio.

One part is the usage of the smaller frame durations. So if you go down from 10 milliseconds to 2.5ms you obviously save some codec delay.

The other part is actually almost as important — the lower number of retransmissions required because you have this availability of the advanced PLC.

So in Bluetooth LE audio, when you configure your connection, you have to say how many retransmissions you would like to have. The more retransmissions you rely on, the better your audio connection will be, because it's less likely to lose a packet if you resend it, like, 20 times.

But I think they're using quite a small number of re-transmissions, like only one, two or three re-transmissions, not that much.

So LC3plus can basically reduce the end-to-end latency by really reducing the codec delay, and ensuring that even at a small number of retransmissions, you can still have a nice connection because you have the advanced concealment — if you lose one or two packets from time to time, this is not so critical because the advanced concealment can really conceal it. With the regular LC3 and only a couple of retransmissions, you probably will not be able to provide a stable enough audio connection as it needs.

So these are more or less theoretical calculations using certain formulas you can use to calculate the end-to-end latency for a certain configuration. And basically we can reduce the end-to-end latency for LC3plus roughly to one-third of regular LC3.

I guess it's hard to experience these values by only looking at the numbers, but you can convert it to different metrics, like how many frames do you lose. So if you have a 60 frames-per-second game, then this 30 milliseconds would be approximately two frames, I believe. This 10 milliseconds would be less than one gaming frame that you would lose, or that you would have delayed.

If you look beyond gaming, if you look at some real-time audio, or real-time music-making experience, like different people making music together online, I guess good musicians start to feel discrepancies if the latency is roughly 10 milliseconds or higher. So if your drum plays a bit delayed and you cannot play your guitar, well, I guess here the delay is actually even more critical that in gaming, and there the threshold sounds like to be like roughly 10 milliseconds.

JEZ: *Yeah, I'd agree with that. 25ms is noticeable so maybe 10ms to reach the threshold.*
ALEX: Yeah. But this is what you can achieve in LE audio. In Bluetooth Classic the story is a bit different; it's trickier to achieve lower delay — the end-to-end latency is mostly determined by the buffer size of your sync device; the higher the audio buffer on the sync device, the higher the latency will be, because you have to buffer this data. However, if you have a large buffer on your sync device, you are less likely to have an audio drop-out, because you still have time to resend a missing packet.

So, you have probably heard of aptX Low Latency, yeah? So aptX Low Latency is not a low-latency codec: it's mostly a configuration of aptX that reuses the sync site buffer. So basically you reduce your audio decoding buffer, so you buffer less data, so you reduce your end-to-end latency. However, you are more prone to audio dropouts.

And this is where LC3plus also can reduce the audio buffer and reduce the end-to-end latency, but still kind of provide you a stable connection because it has the advanced concealment. So even if you have a couple of frame losses it's not so critical because you can actually conceal them.

JEZ: *Yeah, that's cool. Retransmission is something that I've not really looked into it before; I mean, I know it happens, but not how much it happens. So on standard Bluetooth with SBC, say, what percentage of a data stream is taken up by retransmission?*
ALEX: That really depends on your connection.

JEZ: *Yeah, but can it be 10% or is it always 0.01% or a very, very low part of the data stream? Does it become significant in a bad environment?*
ALEX: No, so the retransmission is not part of the bit stream that is being sent. So a retransmission simply means that you resend the whole data packet just one more time.

JEZ: *But it must affect bit rate because now that's taken up bit rate to resend it.*
ALEX: Um, yeah, but I mean, you seem to resend it at a later point, right? So instead of sending the next packet, you just have to resend the one that has got lost.

JEZ: *But this is real-time music, so at some point that's gonna crap out, if it gets to a certain…*
ALEX: Yeah, if your audio buffer is not large enough, you will have audio drop-outs. Your connection will close at some point; you'll have to reinitialise it.

JEZ: *That's very interesting. Thank you very much. I love new information.*
ALEX: I can send you the link to the profile and to the table so you can look up the, um, number of transmissions that's in there.

So now coming to this nice shiny logo! We have two logos. One is our own brown LC3plus logo [*right*] that we are basically willing to license to our customers who implement LC3plus and pass the performance criteria.

The other logo is the 'Hi-Res Audio Wireless' logo, because as you already heard, we certified LC3plus for usage with this logo. So basically, if you implement LC3plus, it opens for you the door to receive this logo, if there are certain other hardware criteria fulfilled.

The Japanese Audio Society has two logos, right? One is the Hi-Res Audio logo, the other one is the Hi-Res Audio *Wireless* logo. So the Hi-Res Audio logo has certain hardware requirements, like you need to support 96kHz 24-bit playback… I guess there are many more and, uh, I'm afraid I cannot disclose all of them to you because we have an NDA…

Hi-Res Audio Wireless logo

JEZ: *I know 40kHz frequency reproduction is one of the key ones.*
ALEX: Exactly. And there is this Hi-Res Audio Wireless logo, which basically adds the requirement of supporting a certified codec on top of that. So basically you need to fulfil the requirements of the Hi-Res Audio logo, and on top of that, you have to use one of these certified codecs which is — up to now — LC3plus, LDAC, LHDC, and this, um, MQair/SCL6 codec. This is basically the requirement.

LC3plus is fulfilling the requirements of the Japanese Audio Society starting at a bit rate of 450kbps per channel. So this is the bit rate you need to operate LC3plus to be compliant with the Hi-Res Audio Wireless logo. For LDAC, the bit rate is a little bit

Latency is a non-critical issue if you're simply listening to music. With video, however, it becomes a crucial factor, while for gamers it can be a matter of life and death...

LC3 plus

The commonly-used 'Hi-Res Audio' and more recent 'Hi-Res Audio Wireless' logos are issued by the Japanese Audio Society, though it isn't clear exactly how a codec or product certifies for the logo use, and this information appears to be covered by an NDA.

higher; it's this 990kbps for a stereo configuration. So this is the bit rate where LDAC achieves or fulfils the requirements of this logo.

JEZ: *Sorry, they think that they fulfil the requirements at 990kbps, at the top level of LDAC, Sony does?*
ALEX: Well, that is our assumption that they fulfil the requirements at this highest bit rate. But very likely they do not fulfil them at the lower bit rates. They have these three operation points, right?

JEZ: *Yeah, I know. Well, okay, but I still don't see how you can get a 40kHz signal down a 450kbps pipe.*
ALEX: Well, the Japanese Audio Society, on top of the requirement of reproducing a 40kHz signal, for the code, the requirements are a bit different — I cannot disclose so much information, but they have their own tool that they use to test the codecs with. And we would very much assume that LDAC passes this test tool starting at 990kbps for a stereo configuration.

JEZ: *So are you saying to me that if I gave you a 40kHz test tone, you could stick it through LC3plus at 450kbps and get a 40kHz test tone out the other end?*
ALEX: Yeah, of course. Why wouldn't you expect that?

JEZ: *Because of Nyquist's theorem? You know, I mean, you need 20kHz…*
ALEX: LC3plus operates up to the Nyquist frequency. So if the input signal is a 96kHz sample, you can achieve up to 48kHz of audio benefit. This is what LC3plus supports. LC3 is always limited at 20kHz audio bandwidth, the LC3 in Bluetooth...

JEZ: *But we're nowhere near lossless then. You're at about, like, a 9-to-1, 10-to-1 compression ratio at that point — you're starting with 4600 kilobits a second uncompressed high-res and you're crushing it down to 500. What are you throwing away?*
ALEX: So this logo is not related to lossless, right? This logo is, uh, not representing any lossless…

JEZ: *OK so that is our biggest problem with it, and John Darko the same, I think — as far as we are concerned, high-res audio isn't high-res audio unless it's lossless. So clearly you don't agree with that statement.*
ALEX: Well, I mean, it depends on what you exactly want to achieve. I mean, if you want to make sure that your codec does not decrease your THD+N performance of your whole system, of your speaker, then you do not need lossless, right?

JEZ: *Then that becomes subjective again. I'm talking objective. I mean, the definition of high-res audio was that it was a lossless thing. As soon as you start throwing bits away, it's not high-res audio. The whole point of high-res audio was to have a box so freaking big you couldn't miss anything. And now we're crushing it down into a pipe which throws a lot of it away. Maybe you can throw some of it away, but it's like, what did 'The Absolute Sound' guy say, it's like a filing cabinet, which has got a paperback book somewhere inside it, but you don't know where the book is. So you have to take the whole cabinet. So the question is always, how do you know to throw away the air and not the book?*

The lossless debate

ALEX: Well, I guess this is what the Japanese Audio Society tried to cope with, right? I mean, they tried to set up a certain standard. It tells you that you are throwing away data because you cannot transmit lossless over Bluetooth, right? It's simply too limited in terms of bandwidth. But I guess they try to come up with a standard that tells you how much can you throw away. So that's why they have this test procedure for the codecs. It tells you how much can you throw away to still be high-res compliant. And the 'high-res compliant' is obviously their definition of high-res compliant.

JEZ: *Can you send me a contact for the Japanese Audio Society? [We have contacted them again for this story, but still no reply.]*
ALFONSO: Sure. Yeah, sure. I can do that.

JEZ: *Because if they're really stamping non-lossless stuff as high-res audio, that's a story in consumer audio land. Because that's not what everybody thinks. Doesn't everybody think that a Hi-Res Audio stamp means lossless high-res? If you ask a company with a pair of headphones that has High Res Audio on the box why it says High Res Audio, they'll say because it can play Hi-Res Audio via the cable, they don't try and claim it's because they can do something high-res audio-ish via Bluetooth or anything else. High-res audio is a lossless standard as far as most of consumer audio land is concerned. And if the Japanese Audio Society is stamping boxes which throw away 'the right amount', then that's just rubbish. For my book.*
ALEX: Yeah I don't think they state 'lossless' on any of their home page, right? I'm pretty sure they don't state that it's lossless.

JEZ: *Well, that pretty much answers all the questions I've had, then, because if high-res audio doesn't have to be lossless then you can stick it through a pipe of one kilobit a second and say it's high res. Doesn't matter. You're just saying it 'sounds' better. It becomes entirely subjective again.*
ALEX: Of course, but I guess that's what the Japanese Audio Society tried to come up with, yeah. To make a logo, to make a standard that somehow specifies, okay, what audio level would you want to achieve to claim that you are Hi-Res?

JEZ: *I was interested in what you said, Alfonso, when you said lossless is one of the biggest scams going round at the moment. So, so when you say like...*
ALFONSO: Don't quote me on that!

JEZ: *[laughs] Oh, sorry, I'm quoting you on everything! Okay, I won't say the A word, but… the lossless streaming that comes from music services. Is it lossless?*
ALEX: Well, I mean, if you look at Apple Music, they're using, I believe, um, ALAC or FLAC. And, well, they say that they're using it to transmit lossless from the streaming server to the iPhone. Of course, the connection from the iPhone to the AirPods will not be lossless any more.

This now comes to a question we've asked repeatedly: does high-res audio have to be lossless? If the answer is no, then it's hard to define what high-res even means. And yet that seems to be how the definition of high-res is now evolving. Is it still high-res audio once you've thrown most of it away?

JEZ: *Oh, we know that. AirPlay 2 is dropping lossless to 256k AAC at the moment; they've surely got to fix that [or give home users an option for full quality, please Apple!]. But in terms of the transmission from Apple to an AppleTV, say, it is lossless, it's Apple Lossless quality, and I believe it is lossless. Their Dolby Atmos is a compression ratio of about 10 to 1, it's terrifying, but the stereo Lossless is lossless, I believe — that's why it sounds so much better than the Atmos signal to me.*
ALEX: I mean, the lossless is still compressed to FLAC, right? But FLAC is a lossless codec.

JEZ: *Yeah, but that's not data destructive. That's the 50% data reduction we can do with codecs by saying, you know, 'I'll have 24 ones in a row now, please'. So we can do about 50% lossless compression, yeah? Agreed? Everything after that is somehow throwing stuff away.*

So we're now just back to a situation where we've got people saying 'my codec's throwing stuff away better than yours'. You see, what I thought was that the Japanese Audio Society logo was actually trying to stop that, and put a standard on it. But apparently not.
ALEX: I'm afraid not.
ALFONSO: There are like two layers. One is this 'high resolution', and then on top, you have the 'lossless'. So you could scale it up like this.

And lossless, that's the other point, means you are not losing quality, but sometimes the original content you may get may not be so good-sounding either. So the fact that you don't lose anything doesn't mean that whatever is being sent is the best quality possible. There are other components to the final output.

JEZ: *Yes, absolutely. In Sound+Image'we used to do high-res reviews with Paul Miller at 'HiFi News' of the early high-res files being released, and I think maybe one in four was found to be upscaled, some of the others had a lot of stuff from the studio which was nowhere near high res, you know, mixed in. So yeah, the material itself, you're absolutely right, can often be questionable at the fundamental level, yes.*
ALFONSO: That's correct.

JEZ: *But in terms of trying to get it through, you know, us poor purists trying to get the actual signal intact from one end to another, it doesn't help us. But great discussion.*
ALEX: Yeh I think, almost done. So just a follow-up question. So did the LDAC engineers tell you that, um, LDAC is lossless?

JEZ: *Okay, so this is it, and you can actually watch the video, it's online. This was at IFA Berlin in 2016 — Sony brought the engineers in, because they were launching some high-res audio stuff. And the first thing was that they'd just released a pair of headphones with the Hi-Res Audio logo on the box. So I was asking about that, and they said, yeah, it's because it can be high-res through the cable, not through Bluetooth.*

But then they were talking about LDAC being "near high-res". They always used the word "near", always "near high res". If you look back to the original literature, I don't know if they're still doing it [Footnote: no, they're not], but back then it was "near high-res". And I was like, "Well, how 'near'

This story from our Editor goes back to a press conference in 2016. He has told it previously in a podcast with John Darko, the webpage for which also links to somebody else's video of the Sony interview session.

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high-res? Because it's half the bit rate and that doesn't seem very 'near' to me."

So basically they were saying that their definition of 'near' was that they could neither hear nor measure a difference between the original high-res file and a 248k version upscaled through their DSEE HX engine. But with a few rare exceptions where there was really complex, dense material, with some of those they could see the difference. So that's why they called it "near" high-res because with some files they could tell the difference.

LC3plus as a toolbox

And I thought that was very reasonable. Although it raised exactly the same question that if 248k, even through an upscaling engine, is generally indistinguishable from the original high-res, why are you guys at Sony champions of high-res when we clearly don't need it?

So yeah, that's where I keep ending up.

ALEX: Okay. Yeah, I guess you come back to what Alfonso already said. We are trying to compete in this high-res market by still giving you the smallest bit rate you would want to use for that, giving this advanced concealment. So that if you want to stick to this high-res market trend then you don't have to sacrifice so much of your valuable bit rate.

JEZ: *Yeah, I totally understand that. I think that's great.*
ALEX: Okay. Just three more slides just on some LC3plus-licensed products, Alfonso?

Expect LC3plus to surface in a wide range of products, from smartphones and earbuds to microphones, wireless speakers, and potentially VR, gaming and PCs.

Bang&Olusen's Beolab 28 was early to arrive with LC3plus in 2022. The $23k-$29k speakers use LC3plus to send signals between the two speakers.

ALFONSO: Well it depends on Jez's interest, but maybe beyond the slide itself, what I can tell you is which markets we are actually most active with LC3plus. One is obvious — the use case from the smartphone to the earbuds — it's not arrived there, but as I said, we are working very closely in the final stages of negotiation with one of the major Chinese smartphone manufacturers, and there the deal is having LC3plus in the source, basically in the smartphone for that manner, and also in different models of true wireless earbuds. So that would be one of the main markets obviously.

And there, another important point is that we are also closely working with Google to try to contribute LC3plus to Android. I cannot give further details, but I think it's fair to say that we are working with them at present to enable the use of LC3plus in Android. And that, of course, will be a very important part to have LC3plus streams available in many source devices.

Another very prominent use case is, let's say home entertainment systems, like from Bang&Olufsen. *[See picture left.]*

And we also signed recently an agreement with Sonos to basically have this ecosystem of soundbars and wireless speaker systems in the home environment. And there, the low delay and the high-resolution audio and the combination of these two features is a key factor of success.

And I think we may not have stressed this enough in this talk today, but one of the winning points of LC3plus is not just this high-res part or the high-res with lower bit rate, or the low delay, or the APLC, but the ability to provide those features simultaneously.

And in many cases — like this home entertainment use case — you tend to need both: the low delay mostly for audio-video synchronisation under different configurations, and then the high-resolution support. So this idea of LC3plus as a toolbox is a very powerful aspect, because we have these three main benefits that companies can integrate simultaneously if they need, so you don't have to really sacrifice high-res against low delay, for instance.

Another very relevant use case is gaming — mostly where LC3plus is being used in dongle-based sources, because we still don't have so many source devices, so they are dongle-based, and then usually based on proprietary RF to further optimise the low delay for gaming headsets.

Also mostly driven by low delay we also have wireless microphones, like recently Anker [AnkerWorks] at CES 2023 got an award for a wireless microphone using LC3plus.

We also see some trend lately in the Metaverse AR/VR story where in-ear earbuds are being deployed to enhance the built-in speakers that are very limited, let's say, in terms of quality and also in terms of capabilities for an immersive experience. And there, LC3plus is quite in demand.

And then we are also having a strategic partnership with Intel to enter mostly the laptop market, and there we have already some advanced discussions with HP, and we also talked to their competitors Dell, Lenovo, etc., also to have this LC3plus support in the laptop PC world beyond, let's say, the gaming-specific use case. So for general-purpose kind of laptops.

So those would be mostly the markets where we are present. Yes, we licensed for DECT but we did not get so many DECT products; a few, but not so many.

JEZ: *Great. I wish you luck. Here's a question then. So Bang & Olufsen, the Beolab 28s, they're only capable of producing sound up to 23kHz. So, if you've got an LC3plus transmission to those speakers, would it be allowed to use the Hi-Res Audio Wireless logo even though the speakers can't go to 40kHz? If the codec's high-res, but the speakers aren't?*
ALEX: I don't think they use the logo.

JEZ: *So no earbuds either will be able to, because hardly any earbuds go over 20kHz, so none of those will be able to use the Hi Res Audio Wireless logo either?*
ALEX: I think there are earbuds from Xiaomi, for example, that can actually reproduce up to 40kHz. I was very amazed to read that earbuds can actually do that. So there should be some products...

JEZ: *Alright, that's cool. So it does depend on the output device as well as just having the codec in place.*
ALEX: Yes.
ALFONSO: Yes you need the hardware on top.

JEZ: *OK guys, great info, I can't thank you enough.*
ALEX/ALFONSO: Thank you.

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FUTURE

CLASSIC MOVIE

There's Something About Mary

The gross-out comedy landmark hit 25 last year, and here the Farrelly brothers reflect on the hits and misses of a box-office smash that smuggled a lot of heart in amid the filth and fluids.

WORDS SIMON BLAND

Ah, young love… a time of first dates, awkwardness and violently getting your junk stuck in your zipper and having to rely on the fire department to help pry yourself free. Odds are you can relate to at least the first two things on this list. The third may be best remembered by Ted Stroehmann (Ben Stiller), the bumbling teen looking for love in the opening moments of 1998's raucous comedy *There's Something About Mary*.

Directed by sibling duo Peter and Bobby Farrelly, this sleeper hit found adult Ted still obsessed with his estranged teenage crush Mary (Cameron Diaz). Keen for a second shot at love, he hires sleazy private detective Pat Healy (Matt Dillon) to track her down, only for the PI to fall head-over-heels for her, too. What follows is a chain reaction as everyone who comes into contact with Mary quickly becomes obsessed, causing even more chaos for poor old Ted.

"We were just doing what we thought was funny," Bobby tells us. "Pete and I were thinking about our own lives and that was something we were always amused by — trying to chase girls out of your league, aiming higher than you might get. That's what Mary was. She was kind of the perfect woman — almost a caricature, the person that the average idiot guy would do backflips over and anything for, including screwing each other over. We were amused by the absurdity of it."

'Yeah, I don't think we're going to need the ladder'

Mate, your dog's not going to be quite so agile soon

After the mammoth success of 1994's *Dumb and Dumber*, the Farrellys returned with *Kingpin* in 1996, a bowling comedy that flopped on release but later gained cult status. For their third film, the pair threw everything at the wall to prove their comedy chops.

"We knew we were getting to the point where we really couldn't pull up short," remembers Peter. "We were going to have to go for an R-rated comedy if we wanted to really do what we wanted. Once we decided that, we just kept going and got a hard R."

That they did. From the aforementioned zipper debacle to thinking up a — shall we say — handy substitute for Mary's now-infamous hair-gel scene, the Farrellys pushed their gags to the limit, creating a word-of-mouth success and birthing a new wave of gross-out copycats in the process.

"We were lucky when it came out because the timing was great," adds Peter. "Nobody was pushing the envelope — and that made it harder to get out by the way because the studio was like, 'Are you crazy? You can't do this. It's nuts!' It took us a while to convince them."

Were they worried their more risqué stuff might not land? '

"We weren't nearly as nervous as Cameron was," says Bobby, discussing the scene where Mary mistakes Ted's jizz for hair gel. "So we said to her, 'Listen, we'll film it and if it doesn't work, we'll just take it right out.'"

Peter agrees that the whole thing was a big swing — but one that ultimately paid off.

"It could've been the moment where everyone in the audience says, 'This is disgusting. What are we watching?'" he admits. "Cameron was at the first test screening. I remember afterwards she came up to us and said, 'Home run, love it, keep it in.'"

Like many early noughties comedies, not everything in *There's Something About Mary* has aged perfectly. Despite including roles for intellectually disabled actors in many of their movies — including *Dumb and Dumber* and Bobby's 2023 comedy *Champions* — by casting non-intellectually disabled actor W. Earl Brown as Mary's brother Warren, both agree they missed the mark.

"Hollywood has changed and we have, too," reasons Bobby. "We put a guy in there playing that role who didn't have intellectual disabilities. Nowadays we would never consider letting someone play that part if they didn't have them. There are people with intellectual disabilities who want to be actors so if a character in the script has intellectual disabilities, let's find someone with disabilities to play that role."

Peter echoes the sentiment: "It didn't even occur to us and it should have. We've learned a lot since."

He's also well aware of the unfortunate connection between Mary's masquerading admirers and catfishing: "I never thought of it as catfishing but it's definitely a light-hearted version of stalking," he says.

However, underneath it all, the Farrellys try to imbue their out-there characters and even more out-there jokes with a heart that helps audiences come along for the ride.

"We've never wanted to hurt anyone in any way," says Bobby. "We don't want anybody to be offended and we never felt like we were laughing at someone's expense. We were laughing at the foibles of being human — and we can all laugh at ourselves."

Peter hopes this sentiment remains visible in the film's lasting legacy: "Ben Stiller plays a goofy-looking guy who can't get a date and gets picked on by his own friends. Yet when he sees an intellectually disabled guy being bullied, he steps up. It's not hard to fall in love with Cameron Diaz but when he hears her life has gone to pieces, he still wants to meet her. That's true love and you root for that."

Cameron Diaz with directors Bobby and Peter Farrelly

The film had heart as much as it had spunk

There's Something About Mary is streaming on Disney+ and Foxtel Now and is available on DVD and Blu-ray.

1986

STAND BY ME'S BRIDGE CROSSING

One of the most famous scenes in Rob Reiner's 1986 classic *Stand by Me* sees our four kid heroes — Chris (River Phoenix), Gordie (Wil Wheaton), Teddy (Corey Feldman) and Vern (Jerry O'Connell) — gingerly set out to cross a 100ft-high railway bridge that spans a river. Naturally, the train arrives when they're at the midpoint and a terrifying race ensues.

"When I was in college, there was a trestle that went across the river," says Stephen King, whose 1982 novella *The Body* acted as vivid source material. "One of the rites of passage at that time was you had to go out and cross the still water on the trestle."

Set in the late 1950s of King's youth, *Stand by Me* strings together several such autobiographical adventures by having the four boys hike along 30 miles of railway track to see a dead body (as a toddler, King's own playmate was struck by a train and killed). En route, they battle leeches, a junkyard dog, emotional epiphanies and a gang of older, flick-knife-wielding boys, but it's the train trestle that's the standout set-piece, sure to have viewers sweating and shaking and bellowing encouragement as Gordie and Vern are chased down by the thundering steam engine.

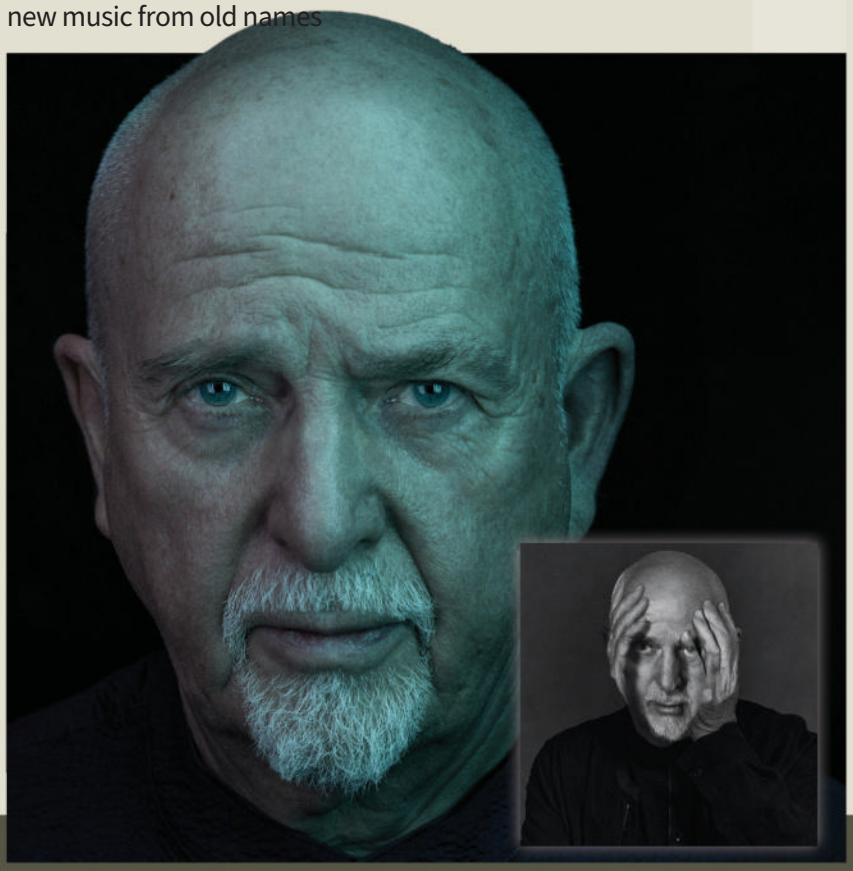
Shot on the McCloud River railroad bridge that spans Lake Britton in California (the trestle's still there, but is now part of a walking trail since the railway was closed in 2005), the scene, perilous as it appears, posed zero danger to the kids. The train had actually only just reached the start of the trestle when Wheaton and O'Connell were jumping off at the other end — Reiner and DoP Thomas Del Ruth used a 600mm long-focus lens to compress the image and create the illusion that the boys were about to be squished.

One problem: without any real jeopardy, the young actors couldn't muster the requisite fear. After several flat takes, Reiner stepped in.

"I told them, 'You kids are fucking this thing up. You see those guys? They don't want to push that dolly down the track any more. And the reason they're getting tired is because of you.' I told them if they weren't worried the train was going to kill them, then they should worry that I was going to. I scared the shit out of them."

"It was the only time Rob raised his voice," recalls Wheaton. And, boy, did it work — the actors' tears are real, and the scene is a classic.

Jamie Graham



NADAV KANDER

PETER GABRIEL *i/o*

Reflective and inventive return from the art-rock master.

Each full moon they came, materialising from the sonic ether — one new Peter Gabriel composition every four weeks or so, slow-building over almost a year into his first full-length album of new material in over two decades, allowing his faithful and broadminded followers to live inside it, an edifice raised around them.

For all its references to futuristic technologies — giant AI globes keeping surveillance over our leaders; headsets that turn our thoughts into pictures — i/o's most impressive invention, at first, appeared to be an actual time machine. With the appearance of the first tracks *Panopticom* and *The Court* it was as if no time had passed since 2002's 'Up'. These were songs steeped in the abrasive industrial menace of *Darkness* from 'Up', the crackling synth noir of *Digging In The Dirt* from 1992's 'Us' and the darkly funky afrobeats of Gabriel's early 80s albums.

Their themes, however, placed them firmly in 2023 and beyond. The dynamic *Panopticom* described an AI-era inversion of Jeremy Bentham's maximum-surveillance panopticon building, instead using satellites to turn Big Brother's cameras back on the overseers and their global wrong-doings. The haunting *The Court*, meanwhile, appeared to target social media's indiscriminate mob justice through which "we've lost the line between the sane and the mad".

As a kind of tech-headed post-prog Bowie, Gabriel was never going to tread the industrial waters of 'Up' too long. Gradually 'i/o' grew ever more reflective, earthy, modernist and ambient. It evolved into Gabriel's most consistent and cohesive post-80s record and the most philosophical of his life. The title track, a celebratory marriage of 2000's airy *Downside-Up* and a Springsteen chorus, explores the interconnectivity of man and nature right up to the worms Gabriel pictures devouring him in his grave. Piano ballads *So Much* and the sublime, orchestrated *Playing For Time* (Randy Newman doing *Here Comes the Flood*) bravely face down mortality.

Gabriel's late-in-life wisdoms naturally veer towards the world-healing. Graceland-ish groover *Live And Let Live*, in very timely fashion, imagines what might happen if the tolerance and self-forgiveness one acquires with age were applied to vengeful and hate-filled international enemies. There are funk pop party pieces too; best is the jubilant *Road To Joy*.

But ultimately 'i/o' will stand as Gabriel's dark, peace-making detente with an out-of-control world he's running short on time to change. *Mark Beaumont*

PINK FAIRIES Screwed Up

Space-rock partying like it's 1969.

With a line-up that includes Pink Fairies founder Paul Rudolph, former Hawkwind bassist Alan Davey and original Motörhead drummer Lucas Fox, this follow-up to 2018's 'Resident Reptiles' comes with a sleaze-rock pedigree to have any fan of the late-60s' underground reaching for the Rizlas. 'You're gonna have to flush your stash!' Rudolph hollers in a pulverising *Whatchagonnado*, while *Punky* is a menacing glam stomp. Throw in some bonkers free jazz (*Big Pink Chopper*), a gonzo sci-fi instrumental (*It Came From Zeta-77073*) and full-tilt covers of Hawkwind's *Hassan I Sahba* and Mick Farren's 1977 Deviants classic *Screwed Up*, and you've got an album worthy of their gilt-edged lineage. **Paul Moody**

VARIOUS ARTISTS
The Faithful: A Tribute To Marianne Faithfull

A starry double-album benefit for enduring British singer and icon.

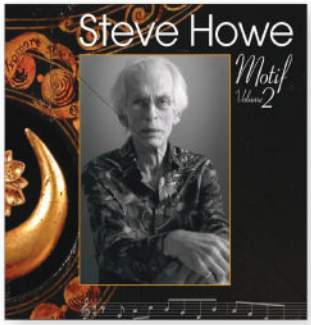
Given that Marianne Faithfull has never been the most prolific songwriter, an album of covers of songs she's done might seem a little nebulous. More accurately, however, this extended tribute doubles as a testament to her indomitable spirit, Faithfull having survived 60s rock-chick stigma, addiction, loss, and various bouts of ill health in recent times. The latter is still an issue, sadly, and all profits of The Faithful are directed into her ongoing recovery from long Covid.

Cue an impressive list of admirers, Shirley Manson, Cat Power, Iggy Pop, Peaches, Lydia Lunch, Donita Sparks and Tanya Donelly among them. Not everything flies (Iggy and Cat's *Working Class Hero*, Tracy Bonham's near facsimile of *As Tears Go By*), but the best interpretations involve Faithfull's 1979 masterpiece 'Broken English'. Shirley Manson and Peaches reshape the fabulously filthy *Why D'Ya Do It* into a electro-disco monster, matched by Bush Tetras' expert negotiation of *Guilt*'s fine line between damaged and defiant. **Rob Hughes**

EDGAR BROUGHTON
Break The Dark

1970s cult legend goes avant-garde on a late-career high.

Edgar Broughton hasn't exactly been breaking his neck to get back into the studio; his last solo record was 2011's 'By Myself', based on live recordings from sundry gigs. But we can forgive the wait, because the adventurous 'Break The Dark' is an unexpected treat for a man now deep into his 70s. He's further distanced himself from the heavy psych-blues of the Edgar Broughton Band's heyday by rooting these experimental songs in programmed drums and electronica, using mostly keyboards to create minimal vistas over which his disquieting vocal takes stock of the personal and political. EBB bassist Arthur Grant is along too, and the other dominant texture is provided by Swedish cellist Calle Arngrip. Broughton pays tribute to his late brother Steve on the haunting *Half Light*, Mick Farren's on-stage demise is referenced in the folky *Sound Don't Come*, while Bonnie Dobson's *Morning Dew* undergoes a radical reinvention, driven by a marauding flute. **Rob Hughes**



STEVE HOWE
Motif Volume 2

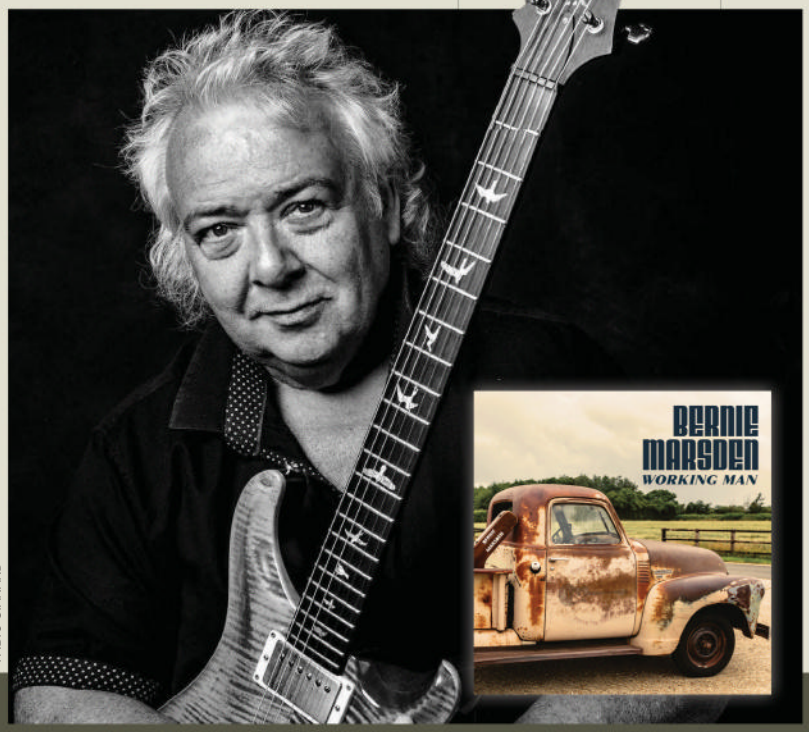
A bunch of Claps.

Early Yes albums frequently featured a Steve Howe guitar instrumental, starting with *Clap* (famously mislabelled *The Clap* by Jon Anderson) on 1971's 'The Yes Album', which set the template for those that followed: a personalised melodic style that incorporates elements of classical, country, jazz, rock, flamenco and folk — but almost no blues — played in a quirky array of time signatures.

Fast forward 50 years or so and Howe is still coming up with nifty vignettes. The difference now is that technology enables him to record them at home and assemble an album on his computer.

There is plenty of variety — even a boogie — although there's a somewhat academic edge to the pleasure of listening to all 16 pieces here in one go. But older fans can savour a couple of revised former glories: *Mood For A Day* from Yes's other 1971 album 'Fragile', and *Beginnings* which opened his 1975 solo album.

Hugh Fielder



FABIO GIANARD

BERNIE MARSDEN *Working Man*

Final album by blues aficionado and former Whitesnake star.

Bernie Marsden passed away on 24 August 2023, aged 72. Too soon in so many ways, but not least because earlier that month he had approved the artwork, sequence and audio masters for this fine, fine album.

Conquest Music respectfully considered delaying its release but as Fran Marsden, Bernie's wife of over 40 years, explains: "Bernie was really excited about his new album and proud of the tracks featured on it. After the last three albums of covers he was keen for his fans to hear some new, original songs."

On CD or vinyl, there are 12 of those — plus 10 other new recordings (half of them covers) on a bonus disc. Having reinforced his A-star blues credentials with those 'Kings', 'Chess' and 'Trios' albums, 'Working Man' sees him closer to the style that defined Whitesnake when David Coverdale first took them around UK clubs in 1978. The rocking opener *Being Famous* could have worked on any of their first five albums. Likewise *Midtown*, the balladic *Longtime* and *Bad Reputation* — even if here delivered with a subtlety his former band might have eschewed. Then there's the two-minute 12-string instrumental *Steelhouse Mountain* echoing Bernie's intro to Whitesnake's *Ain't Gonna Cry No More*.

But this is not to suggest these songs could have been done better. Bernie Marsden stamps his identity on all of them with measured guitar playing and honeyed vocals. It should be stressed that he was a very fine singer with a great range: handling anything from Lizzy-esque rocker *Valentine's Day* through the beautiful and country-ish *Savannah to You Know*, which sounds like something Nils Lofgren might want to cover. He's also generous enough to let the voice of Nashville high-flyer Jaime Kyle steal his thunder on *Invisible*, and pay tribute once more to Peter Green on the closing jazzy instrumental *The Pearl*.

The bonus disc is no space filler and definitely worth acquiring — and not only for rockers *Look At Me Now* and *Who's Fooling Who*, both better than some on the main album. It also includes *Midnight Believer*'s high-stepping Steely Dan-style funk and the instrumental *Foolish Day*. Marsden's guitar work on both is genuinely impressive. Likewise his new takes on four 'Snake favourites (deep cuts *Till The Day I Die* and *The Time Is Right For Love*, plus *Here I Go Again* and the Bobby Bland cover *Ain't No Love In The Heart Of The City*) before a radical reworking of Robert Johnson's *Come On In My Kitchen* that closes proceedings. Two discs, 22 songs, one very worthy epitaph. *Neil Jeffries*

THIN LIZZY *Vagabonds Of The Western World*

Wand'rin' stars...

Vagabonds Of The Western World, we hear, "is widely regarded as Thin Lizzy's breakthrough album". More accurately, it's the album that just so happened to be released during the band's breakthrough era.

The album's original eight-song version was, and remains, an erratic affair. It was issued in September 1973 after a period of frustration for Phil Lynott, Eric Bell and Brian Downey. Lizzy had finally won success the previous year, when *Whiskey In The Jar* soared to No.6 in the chart. But the track — a variation of an ancient Irish folk-song — wasn't included on 'Vagabonds'… Another absentee was its b-side, *Black Boys On The Corner* — one of Lynott's defining compositions. The jaunty, Spanish-y *Rudolph's Tango* single didn't make the cut either. There's little doubt that the inclusion of that particular trio — replacing the schizophrenic *Slow Blues*, the eco-boogie of *Mama Nature Said* and the cloying *A Song For While I'm Away* — would have elevated Lizzy's third studio album to legendary status. (Still, all of the above are present here, in various forms.)

As an aside, one has to recall the atmosphere of those early 70s music times. Rock combos despised being known as 'singles bands'; albums of all-new material were the order of the day, for fear of 'ripping off the fans'. So, yeah, you can see where Lizzy were coming from.

What else? Well, the mythical prog of *The Hero And The Madman* is encumbered by jarring Canadian narration by 'Kid' Jensen. *Gonna Creep Up On You* — "On YERRRRR," as Lynott snarls — has dated badly in these stalkin' days. But there are golden moments. *Little Girl In Bloom* — 'She's gonna be a mammy soon' — is poignant, fragile, masterful. The title track is magnificently, charismatically Oirish. And *The Rocker*'s primaeval pyrotechnics smoulder on: soon-to-depart guitarist Bell is on sizzlin' form; we can even forgive that Dick Emery moment: 'Oo-oh, I'd do anything for you, cos you're a rocker.'

This collection arrives in various formats: 3-CD plus Blu-ray; 4-LP; truncated 2-LP in purple vinyl. Extras include radio sessions, live rarities, demos and outtakes. But beware, the slick Dolby Atmos remixes don't match the razor-cut classics. It's good to hear the storming *Suicide* (a personal fave) crop up during a Radio One live recording. But the gushingly reverential song intros are wince-inducing. It sounds like The Pope is being welcomed on stage. Mr Philip Parris Lynott would surely have had something to say about that… *Geoff Barton*

JOHN WETTON
An Extraordinary Life

Wetton's six solo sojourns and more...

During the course of a complex four-decade career with Asia, King Crimson, UK, Family, Wishbone Ash and more, John Wetton also recorded several solo albums, from which this set of six studio albums and a couple of CDs of unreleased material have been compiled.

Although 1980's 'Caught In The Crossfire' is eclipsed musically by most of its successors, interest is most likely to centre on that solo debut, as it contains several ideas that foreshadow Asia's debut a year later, albeit dressed up in a pop-rock format. There's also a nod towards another great singing bass player of the era, Sting, on some other tracks.

The other albums, culminating in 2011's 'Raised In Captivity', all include a couple of Asia-like tracks and at least one well-crafted instrumental, but they generally have an uneven quality towards the end with a cheesy track or two, despite recurring guitarists such as Robert Fripp and Steve Hackett, and Asia-mate Geoff Downes who gives Wetton's songwriting a timely boost.

Two CDs of unissued tracks are an opportunity for prog archaeologists to sift hidden gems, but revelations are thin on the ground. **Hugh Fielder**

VARIOUS ARTISTS
Pushin' Too Hard: American Garage Punk 1964-1967

Hard to fault...

An immaculate collection of, yes, American garage-punk from the heady years of '64 to '67, featuring such legendary names as ? And The Mysterians, The Seeds, The Standells, Electric Prunes and Captain Beefheart (yes, that Captain Beefheart), alongside lesser-known luminaries that rocks as hard as… well, this.

Not everything here hits as hard as The Barbarians' gender-twisting *Are You A Boy Or Are You A Girl?* or The Strangeloves' otherworldly great *I Want Candy*, but what does? Inspired by the British Invasion of The Beatles, Stones and Yardbirds — and in many cases better — this 3-CD 94-track premier sampling harks back to when rock music was in its snarling, primal, raw, unfettered infancy, and all the better for it. **Everett True**

BRINSLEY SCHWARZ
Thinking Back (Anthology 1970-75)

7 discs, 132 tracks, one frustrating career.

History hasn't been kind to Brinsley Schwarz, a band still rather harshly dismissed as either mere pub rockers or a convenient launchpad for chief songwriter Nick Lowe. The charts of their day were similarly unkind.

'Thinking Back' is the whole story, comprising their six albums, from 1970's self-titled debut to 1974's Dave Edmunds-produced T'he New Favourites' which included the original *(What's So Funny 'Bout) Peace, Love & Understanding*. Extras abound, so there's 1975's brisk, America-friendly 'It's All Over Now', the appositely-titled seventh album, which was unreleased until 1988 and introduced Lowe's *Cruel To Be Kind*.

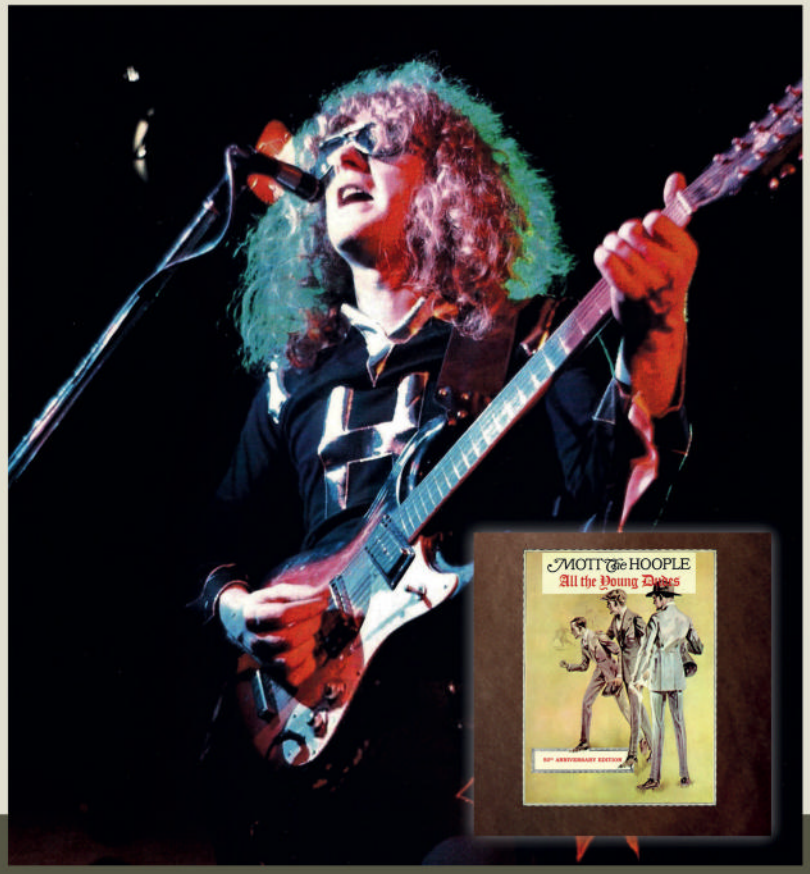
There's a handful of unreleased tracks, mostly from the early years, notably the rueful, organ-led *Crime Of Passion*. There's a rich assortment of live material, from 1972 to the very last days, which confirm their progression from undeniably pubby to something more akin to cosmic country, embracing Americana long before Americana was invented. Yet in a 1975 rendition of their harmony-drenched finest moment, *Don't Give Up On Love*, the vocals suggested they'd been a British Beach Boys all along. For all that, it's hard to argue with guitarist Ian Gomm's epitaph in the sleeve-notes: "We never seemed to make any progress". **John Aizlewood**

TRAPEZE
Lost Tapes Vol. 1

New treasures from almost-famous heavy groovers..

Earlier this year, the Trapeze compilation 'Don't Stop The Music' (sub-titled Complete Recordings Vol 1, 1970-1992) shone a deserved spotlight on an oft-forgotten but ultimately influential force in British rock. But how 'complete' was that compilation, given these 'Lost Tapes Vol 1' from a different label, Metalville?

It's a welcome surprise to find that much of this collection stands proud alongside some of the band's best work. Production values are hardly stellar, but the lo-fi likes of *Lover* and *Bad Kid From School* sound like a scrappier Led Zeppelin, yet imbued with extra R&B feel. *Don't Let Them Push You* resembles Big Star with bigger boots on and the boogie-infused *Lights Of Tokyo* is surely a hit single the world missed out on. Even with Pete Goalby replacing Glenn Hughes and Mel Galley on vocals, later material such as *Cool Water* and *You've Got It* retain a gutsy soulful strut. **Johnny Sharp**



MOTT THE HOOPLE *All The Young Dudes*

"Hey you! You with the glasses! I want you!"

Hard to believe that it's 50 years since Mott The Hoople, tired of slogging around the circuit for no reward, decided to split up. Of course, it's also 50 years since David Bowie stepped in at the last minute and offered the band a new song, *All The Young Dudes* (after they'd famously turned down *Suffragette City*), which changed the band's fortunes for ever. *Dudes* is one of the great rock anthems, the glam-rock *Like A Rolling Stone*, and the perfect song for Mott, who may have been a bit old for the sentiments (they were more like the brother back at home with his Beatles and his Stones than the glittered-up kids in the song), but brought to it a grungy soul (and a world-beating talk-over finale by Hunter) that Bowie's version lacked. Bowie himself would move on after the band turned down follow-up *Drive-In Saturday* (causing him to shave off his eyebrows in a sulk, he later claimed) but then 1972 was his great year (as well as *Dudes*, Bowie also had the Ziggy album, and Reed's 'Transformer' under his production belt).

Dudes was Mott The Hoople's biggest hit, and the new album, on new label CBS, with shiny production by Bowie and his sideman Mick Ronson, fell into place with ease. Lou Reed turned up to be impressed by Mott's version of his *Sweet Jane*. Mick Ralphs introduced both the hefty *Ready For Love* and the great *One Of The Boys* (later recycled as *Can't Get Enough* for Bad Company). Ian Hunter wrote *Sea Diver*, one of the greatest of his great ballads. As an album it's pretty good, but as a handbook for Mott's future — mixing the Dylan-sings-Stones heaviness of their late-60s work with the pop snap of early-70s glam to create something new — it's fantastic. Even better Mott The Hoople albums would come, but 'All The Young Dudes' is the template for everything that followed, even down to releasing Ian Hunter's hitherto unknown talent for writing classic three-minute singles.

The extras on this limited-edition double CD are mostly familiar — different takes and so forth — but fans will delight in the Tippins tracks, rocking covers sung by road manager and original Mott vocalist Stan Tippins on a night when Bowie didn't turn up and the band didn't want to waste studio time. *David Quantick*

CLASSIC TRACK

Green Day – *American Idiot*

2004

Green Day's new 2024 album is just out, but their great 'resurrection' track was 20 years ago: *American Idiot* thrilled both old fans and new.

At the time they recorded *American Idiot*, Green Day were finished, washed-up, done. The California trio could still fill a room on the fumes from 1994's 'Dookie', an album that had chimed with a rock scene that needed cheering up after Kurt Cobain's suicide and grunge's death rattle. But creatively and commercially it had been a long decade's downturn, capped by the ignominy, on 2002's Pop Disaster Tour, of Billie Joe Armstrong, Mike Dirnt and Tré Cool trading headline status with thunder-stealing successors Blink-182. "For some fans," wrote biographer Ben Myers, "it was total confirmation that Green Day had lost it and were resorting to touring with their own lightweight doppelgängers."

But perhaps these thirty-something punks still had something up their sleeves. Measured against globe-shaking events washing in on the ripples from George W Bush's election and the terrorist attacks of 9/11, the rebirth of Green Day might have seemed like a footnote. For fans of back-to-basics rock'n'roll, though, the title track was a joyous chink of light, puncturing the West's febrile mood with a fistful of brittle chords and a clarion call: '*Don't want to be an American Idiot/ Don't want a nation under the new mania.*'

If a creative rebirth seemed unlikely, then Green Day's politicisation was unthinkable. To date, the band's most-quoted line came from slacker anthem *Longview* ('When masturbation's lost its fun, you're fucking lonely'). But when they released *American Idiot* as a single in August 2004, the formerly bleach-haired and goonish Armstrong seemed like a rock star reimagined by Tim Burton and Noam Chomsky, now chronicling the itchy paranoia, media-orchestrated hysteria and gormless White House administration playing out on rolling news channels. '*Well maybe I'm the faggot America*,' he raged.'*I'm not a part of a redneck agenda.*'

Locking swords with George W and his red-state support was a risky move for any rock band; only a year earlier, the (Dixie) Chicks had been blacklisted by the country scene for criticising Bush from the stage in London. To his credit, Armstrong was unrepentant. "We live in times of terror, and now is the time to speak out," the singer reasoned of his new-found ire. "We wanted to face danger, put it on the line and tell people what we think. Rock'n'roll is supposed to be dangerous. That's where we come from."

American Idiot's polemic wouldn't have counted for much, of course, if the sugar-rush hooks hadn't forced the song onto every radio playlist across the planet. Despite opening a punk-opera concept album that was often musically sprawling — consider the nine-minute, five-section *Jesus Of Suburbia* — the title track couldn't have been leaner, simpler or more whip-smart. With Armstrong citing his preference for Quadrophenia's "power-chord, mod-pop aesthetic" over weightier works like Pink Floyd's *The Wall*, *American Idiot* wasn't much more than a four-chord thrasher; it didn't even have a riff.

Yet the scalded attack of Armstrong's playing reminded you just how powerful a well-struck electric guitar could be. And when the band dropped out then exploded back in at the 2:22 mark, the effect was akin to a detonation. Especially when you watched the heavy-rotation music video, in which Armstong mimed blowing his head off.

With 16 years of hindsight, there's a case that Green Day's 'American Idiot' retooled the concept album for the post-millennium. But as the title track flew to No.7 in Australia in the summer of 2004 — reconnecting with older fans who'd drifted away, and kids who heard something in the singalong venom of these kohl-eyed provocateurs — it achieved something every bit as noble. In a world gone to hell, *American Idiot*'s three-minute riot was a reminder that rock still had something to say, and adhered to the old punk maxim that anyone in possession of three chords, at least two fingers and a guitar turned full-up could say it. Not so dumb after all. — *Henry Yates*

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